Zoological Journal of the Linnean Society, 2002, **134**, 57–140. With 51 figures

Taxonomy, phylogeny and biogeography of *Politolana* Bruce, 1981 (Crustacea: Isopoda: Cirolanidae)

SARAH F. RISEMAN[1] and RICHARD C. BRUSCA[2]*

[1] *University of Charleston, Grice Marine Biological Laboratory, 205 Fort Johnson, Charleston, SC 29412, USA*
[2] *Arizona-Sonora Desert Museum, Tucson, AZ 85743, USA*

A taxonomic revision of *Politolana* based on an inferred phylogeny of the genus is presented. Included are revised descriptions and diagnoses of the genus and species, and a key to all the known species. Six of the 10 previously described species are redescribed: *Politolana polita* (Stimpson, 1853), *Politolana concharum* (Stimpson, 1853), *Politolana micropthalma* (Hoek, 1882), *Politolana impressa* (Harger, 1883), *Politolana eximia* (Hansen, 1905) and *Politolana wickstenae* Wetzer *et al*., 1987. Neotypes are designated for *P. polita* and *P. concharum*, and lectotypes are designated for *P. impressa* and *P. eximia*. The diagnosis of the recently described *Politolana tricarinata* Riseman *et al*. (2001) is included and two new species, *Politolana impostor* and *Politolana haneyi*, are described. All descriptions include synonymies, distributional information and illustrations of all appendages, mouth parts and dorsal and lateral body views (with the exception of the *P. wickstenae*). A data matrix of 61 morphological characters for 15 taxa (10 previously described and two new *Politolana* species, and three out-group genera) was analysed using parsimony-based cladistic methods. The analysis resulted in five equally most parsimonious trees. The relationships among most *Politolana* species were fully resolved in the strict consensus tree and indicate that *Politolana*, as previously defined, is paraphyletic. We recommend that three species, *Politolana crosnieri* Bruce (1996), *Politolana obtusispina* (Kensley, 1975) and *Politolana dasyprion* Bruce (1991), be removed from the genus. New generic assignments for these species await publication of the phylogenetic analysis of the family Cirolanidae (currently being prepared by the second author). The phylogeny of *Politolana* comprises two well-supported species-group clades. Collection data indicate that *Politolana* species are benthic scavengers occurring on the continental shelf and slope from shallow waters to depths greater than 650 m. The geographical distribution of the genus, both at the species level and at deeper levels of the phylogeny, corresponds to recognized zoogeographical regions. The genus has had virtually all of its radiation in the west Atlantic. A single north-east Atlantic species (*P. micropthalma*), with its closest relative in the north-west Atlantic, is either the result of a dispersal event from the western Atlantic, or a vicariance by-product of the opening of the Atlantic. Evolution within the genus has established an antitropical distribution resulting in a south-west Atlantic clade. *Politolana haneyi* has a distribution that was established sometime before the closure of the Panama Seaway and that species was divided into Pacific and Gulf of Mexico populations with the formation of the Panamanian isthmus. A high degree of sympatry among sister species in the genus is also apparent. Potential historical explanations for these patterns are reviewed.

ADDITIONAL KEY WORDS: systematics – antitropical – transisthmian – Crustacea – cladistics – Isopoda.

INTRODUCTION

With around 10 000 described species, approximately half of which are marine, the order Isopoda is one of the most species-rich crustacean higher-level taxa. Isopods commonly play key roles in marine benthic food chains as abundant herbivores, scavengers, predators, parasites of fishes and other crustaceans, and as prey for epibenthic fishes (Brusca & Iverson, 1985; Bruce, 1986; Brusca & Brusca, 1990; Brusca *et al.*, 1995; Keable, 1997). Despite their importance, little is known of isopod evolutionary history and biogeography. Brusca & Wilson (1991), in a phylogenetic analysis of the isopods, found the Isopoda to be a monophyletic taxon, but they could not resolve the relationships of the large, nonmonophyletic suborder Flabellifera, to which the Cirolanidae are assigned.

With 56 genera and 420 species, Cirolanidae is one of the three largest families (with Cymothoidae and

* Corresponding author. E-mail: rbrusca@desertmuseum.org

Sphaeromatidae) in the suborder Flabellifera. For recent reviews of cirolanid taxonomy see Keable (1997) Bruce (1981a, 1986) and Brusca *et al*. (1995). Historically, workers have suggested affinities among the genera within Cirolanidae and have proposed both formal and informal groupings (see Bruce, 1986, for a detailed historical review). In short, Racovitza (1912) established six cirolanid subfamilies that Monod (1930, 1971a, 1972) later rejected and replaced with seven informal 'groups'. Monod's groupings were used until Bruce (1986) found them unacceptable due to the heterogeneity within them and because new genera had been assigned to these groups over the years without any clear method for doing so. Bruce (1986) recognized three new groupings of cirolanid genera. He provided characters to unite these genera, but he did so in the absence of a comprehensive character treatment or cladistic analysis. These informal groupings were nevertheless quickly adopted and two of the three groupings were given formal subfamily status that same year (Botosaneanu *et al.*, 1986): the Eurydicinae and the Cirolaninae.

The remaining genus-group discussed by Bruce (1986), often referred to as the *Conilera* genus-group, includes: *Conilera* Leach (1818); *Conilorpheus* Stebbing (1905); *Dolicholana* Richardson (1913); *Natatolana* Bruce, 1981a; *Oncilorpheus* Paul & Menzies (1971); *Orphelana* Bruce (1981b); *Politolana* Bruce, 1981a. Wetzer *et al*. (1987) removed *Oncilorpheus* from this genus-group because it lacks most of the diagnostic characters Bruce (1986) used to define the group. They also remarked on the possible paraphyletic nature of *Natatolana* and *Politolana* and noted that three of the remaining genera in this genus-group (*Orphelana*, *Dolicholana* and *Conilorpheus*) disagree with the frontal lamina morphology purported to be diagnostic of the *Conilera* group. However, for the sake of consistency, the *Conilera* genus-group was given formal subfamily status as the Conilerinae by Kensley & Schotte (1989). They provided the following diagnostic features for the subfamily: flattened clypeus, flat narrow frontal lamina, antenna peduncle articles 3 and 4 subequal in length, pereopods 1–3 with ischium and merus anterodistally produced, lacking secondary ungui on dactyls, and with natatory setae on pereopods 4–7.

Politolana is the second largest genus in the subfamily Conilerinae. The genus was erected by Bruce (1981a) to unite six species previously assigned to either *Aega* or *Cirolana*: *Politolana concharum* (Stimpson, 1853), *Politolana impressa* (Harger, 1883), *Politolana polita* (Stimpson, 1853), *Politolana eximia* (Hansen, 1890), *Politolana micropthalma* (Hoek, 1882) and *Politolana obtusispina* (Kensley, 1975). All of these species, with the exception of *P. obtusispina,* which was described from Still Bay South Africa, are strictly Atlantic in distribution. Since the formation of the genus, three additional species have been described: *Politolana wickstenae* Wetzer *et al*. (1987) from the northern Gulf of Mexico, *Politolana dasyprion* Bruce (1991) from south-eastern Australia, and *Politolana crosnieri* Bruce (1996) from New Caledonia. In addition, three new species have been identified in the course of this work: *Politolana tricarinata* Riseman *et al*. (2001) from Brazil, *Politolana impostor* n.sp. from the north-west Atlantic and *Politolana haneyi* n.sp. from the Gulf of California and Gulf of Mexico. This brings the total to 12 reported (nominate) *Politolana* species.

Species of *Politolana* are relatively large-bodied (6–45 mm in length) benthic scavenging isopods. They have been collected in baited traps, bottom grabs and trawls from depths of 2 m to over 650 m. Some species have been collected in great numbers whereas others are rare; two species are known only from single specimens. The majority of species occur in the western Atlantic from boreal to subtropical latitudes, but three species have been described from the Pacific, one of which occurs in both the Pacific and the Atlantic. In the western Atlantic and Gulf of Mexico all *Politolana* species have ranges that overlap with at least one other congener, and some areas support as many as four sympatric species. In areas supporting several abundant *Politolana* species, this genus forms an important component of the benthic scavenging guild. *Politolana* (as *Cirolana polita*) is a component of the necrophage assemblage on the South Carolina continental shelf and upper slope (Biernbaum & Wenner, 1993). They have been collected in baited traps, lobster pots and from specimens of a variety of fishes and marine mammals. In addition to their role as scavengers, these isopods are prey of epibenthic fishes. *Politolana* have been found in abundance in areas that support important fisheries, such as Georges Bank (north-eastern USA). *Politolana* specimens have been reported in the gut contents of Atlantic sturgeon (Rachlin & Warkentine, 1997), as well as in the gut contents of the threatened Franciscana or La Plata dolphin, *Pontoporia blainvillei* (collection information from museum labels).

Despite the relatively recent establishment of the genus *Politolana,* and the abundance of available material for many of the species, revision is needed for several reasons. Many of the described species needed re-description because they were first described in the 1800s and much of this early literature is inadequate. The type material for three species, one of which is the type species of the genus, has been lost and two of these were not figured in the original descriptions. These facts, combined with the strong morphological similarity among the species, has led to the misidentification of many *Politolana* specimens. Of the museum lots we have examined, over 50% were misidentified, leading us to conclude that all *Politolana* identifications must be regarded as suspect.

In addition to the incomplete nature of the existing taxonomic work, the validity of this genus, as currently constituted, is questionable. *Politolana* was erected in an attempt to break up the large and obviously polyphyletic genus *Cirolana*. Bruce (1981a) recognized some 'major species-divisions' within *Cirolana* and established several new genera based on these divisions. This process was based on shared characters but without a phylogenetic analysis, and like many cirolanid genera, *Politolana* was diagnosed by a combination of plesiomorphic characters rather than by any specific synapomorphies or characters unique to the group. At least two of the nominate species do not agree with existing generic diagnoses. Bruce (1991) recommended that one of these species, *P. obtusispina*, be considered *incertae sedis* until *Politolana* is fully revised. The other, *P. crosnieri*, differs in characters that are usually considered of generic importance (shape of the frontal lamina and proportions of articles in the antennule peduncle) (Bruce, 1996). The increase in number of species being assigned to *Politolana*, and the lack of any identified synapomorphic features of the genus, suggested that it may not be a monophyletic taxon.

This work provides a complete taxonomic revision of *Politolana* and tests the monophyly of this genus with parsimony-based cladistic methods using a large data set of morphological characters. The phylogeny of *Politolana* is used in a biogeographical analysis to examine the unusual distribution of this genus.

PHYLOGENETIC TREATMENT

METHODS

Fifteen taxa were included in the phylogenetic analysis. The in-group included the 12 nominate *Politolana* species, 10 of which were previously described and two of which are newly described herein. Until a family level revision (currently underway by the second author) demonstrates which genus is most closely related to *Politolana*, it is optimal to include several genera in the out-group. While the phylogenetic validity of the Conilerinae has not yet been tested, at this point it stands as the best guide to those taxa that might be closely related to *Politolana*. Thus, we chose three genera from Conilerinae as out-group taxa: *Conilera*, *Dolicholana* and *Orphelana*. *Natatolana* was not used because of its large size (over 60 species).

Sixty-one morphological characters, with 2–6 states each, were identified by examination of specimens and from the literature (Appendix 1). Several characters are autapomorphic and therefore did not contribute to tree structure. We did not exclude these characters from the data set because they may become informative with the addition of future information pertaining to this genus, or the discovery of additional species, and because their inclusion provides clear statements defining the in-group species. Two morphometric features originally used to diagnose the genus *Politolana* (shape of pleopod 1 peduncle; uropod endopod lateral notch) were not used in the final analysis because they proved to be too continuous to score with complete confidence. However, arbitrarily scoring these characters and including them in the analysis does not alter the resulting tree (i.e. the *Politolana sensu stricto* clade remains distinct).

The data matrix (Appendix 2) was analysed using a parsimony-based inference algorithm with the computer program PAUP version 3.1 (Swofford, 1993). Taxa with multistate characters were interpreted as polymorphic. The branch-and-bound algorithm, an exact algorithm able to identify all optimal trees, was used to search for the shortest trees, with the program collapsing zero length branches. The PAUP option to root trees at an internal node with a basal polytomy was chosen because relationships among the out-group taxa are unknown and the monophyly of the in-group was uncertain. All characters were left unweighted and unordered.

We examined several measures of support for the resulting topologies including the consistency index, bootstrap proportions and decay indices, a measure of branch stability that reflects the number of additional steps in tree length required before the indicated branch collapses (Bremer, 1994). In discussing character support for branches, we use only those character changes that are unambiguous and do not change with different optimization methods. We also clearly distinguish between character changes in homoplasious vs. nonhomoplasious characters.

SPECIMENS EXAMINED

For the nine species reviewed in the taxonomy section, the specimens examined are listed in the material examined section of the description. In addition, the following *Politolana* lots were examined: *P. crosnieri*: female holotype, MNHN#Is3075, New Caledonia, 22°55S, 167°24E, 650 m; *P. dasyprion*: female holotype, MVic#NMVJ11562, Bass Strait, Australia, 39°22S, 143°28E, 106 m; *P. obtusispina*: male holotype, SAM#14828type, 2 female paratypes, SAM#14741, Still Bay, South Africa, 120 m, 3 spec.

The following material was examined for coding the out-group genera: *Conilera cylindracea*: ZMUC#CRU2396, 30+ spec.; ZMUC#CRU2397, 5 spec. *Conilera menziesi*: USNM#138722, off NC, 500 m, col. by George and Menzies. USNM#280106, off SC; 50+ spec. *Dolicholana elongata*: BM#1984.20.1. AM#P49418, 1 spec. *Orphelana perplexa*, Bruce, 1981b: male holotype, MVic#J660, Crib Point, 38°21S, 145°12E, 15 m.

RESULTS

The branch-and-bound search produced five equally most parsimonious trees (MPTs) (Fig. 1), each with a length of 158 steps. In all MPTs, nine of the 12 *Politolana* species comprise a single clade. The topology of this clade is identical in all five MPTs and is thus fully resolved in the strict consensus tree shown in Fig. 2. This lineage, hereafter referred to as *Politolana sensu stricto,* has two main clades. One clade contains two pairs of sister species: *P. polita–P. concharum* is sister to *P. micropthalma–P. impostor*. The other clade includes the remaining five species, with *Politolana haneyi* basal to a clade containing the sister groups *P. eximia–P. tricarinata* and *P. impressa–P. wickstenae*. The consensus tree reveals that all disagreement among the MPTs is confined to the relationships among the out-group genera and the three outlying *Politolana* species: *P. dasyprion*, *P. crosnieri* and *P. obtusispina.*

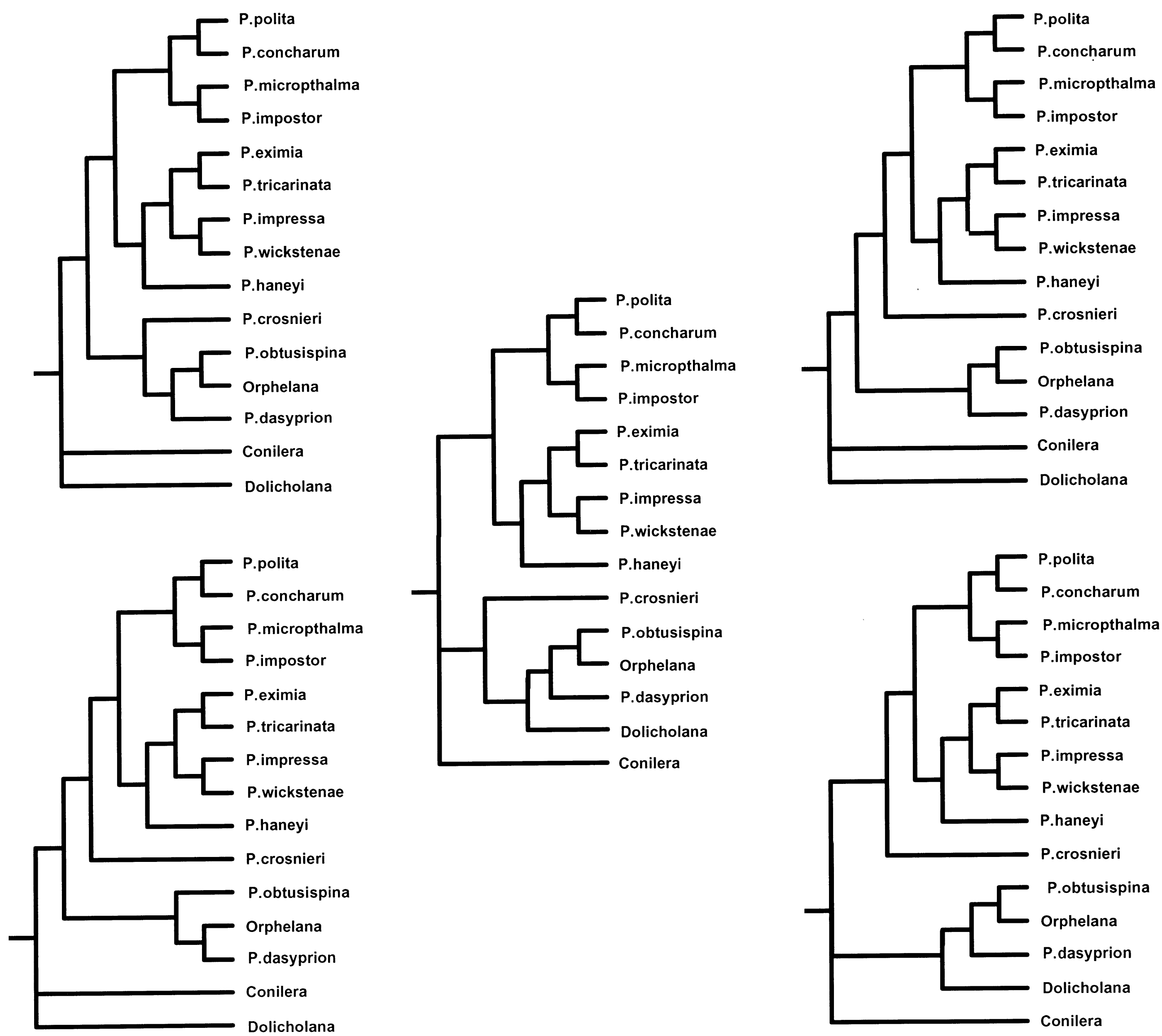

Figure 1. Five equally most parsimonious trees resulting from branch-and-bound search, PAUP version 3.1. For all five trees, length = 158 steps, CI = 0.65, RI = 0.65, RC = 0.43. With six uninformative characters removed, length = 151 steps, CI = 0.63, RC = 0.41.

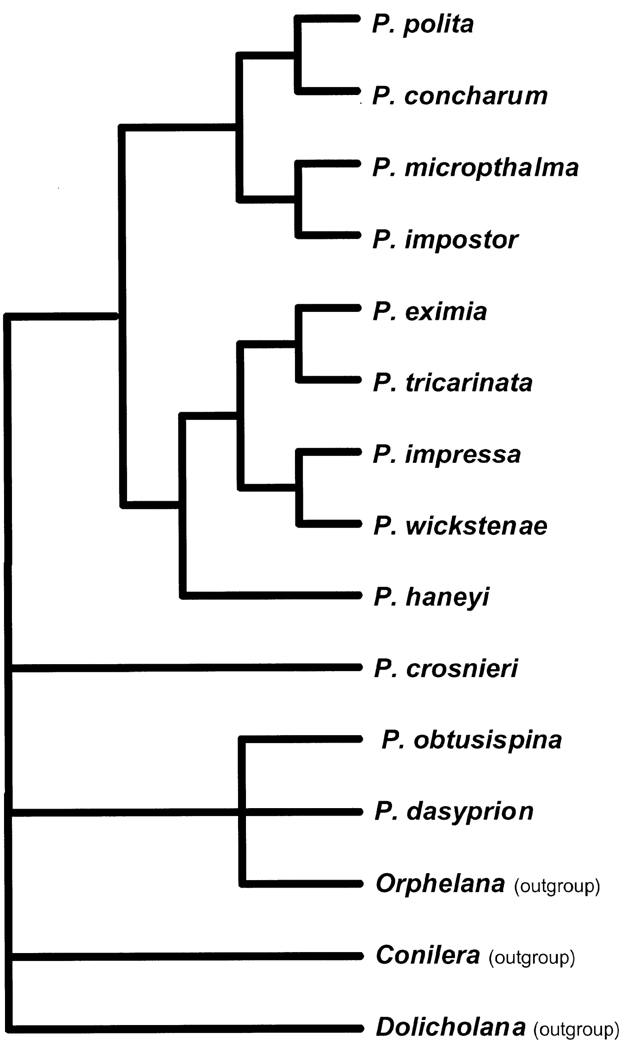

Figure 2. Strict consensus tree of five most parsimonious trees. Disagreement is confined to the relationships between the out-groups and three *Politolana* species, *P. dasyprion*, *P. crosnieri* and *P. obtusispina*, that do not belong to *Politolana sensu stricto*.

Each of the MPTs has an RC = 0.43, an RI = 0.65 and a CI = 0.65. The CI drops to 0.60 with the six uninformative characters (autapomorphies) removed. These values indicate the trees have a notable degree of homoplasy, despite the fact that a single in-group phylogeny results. The program MacClade (Maddison & Maddison, 1992) was used to examine the character transformations in the *Politolana sensu stricto* clade in isolation. Higher 'measures of fit' within this clade (RC = 0.61, RI = 0.78 and CI = 0.79) indicate that much of the observed homoplasy results from characters that are homoplastic in the context of the entire phylogeny, but which are informative and nonhomoplastic (have a CI = 1 and RC > 0) within the *Politolana sensu stricto* clade.

Figure 3 depicts all unambiguous character change (transformations that do not change with different character optimization) occurring on the branches of *Politolana sensu stricto*. As can be seen, change is not distributed equally on the branches. However, all but two of the branches within the *Politolana sensu stricto* phylogeny are supported by at least one character transformation, and three of the eight are supported by at least one uniquely derived synapomorphy. We will not discuss each of these synapomorphies, as they are provided by Fig. 3 in conjunction with the character list. However, we will briefly mention a few of the characters that are of most utility in distinguishing species, that unite *Politolana sensu stricto* and that define the two basal lineages within this clade. Branch 1, which unites the species of *Politolana sensu stricto,* is supported by four characters (3, 26, 51, 52), but character 51 is the only nonhomoplasious binary character. Therefore, the single apomorphic state of this character (the presence of a lateral setal fringe on pleonites 2–4) can be viewed as the strongest defining feature of this clade.

The two main clades within *Politolana sensu stricto* (supported by branches 2 and 3) can easily be distinguished by several characters. The lateral margins of the raised frontal ridge clearly bisect the eyes in all species belonging to clade 3, whereas this ridge reaches but does not bisect the eyes in the species of clade 2 (character 2). The species within clade 2 lack oblique impressions on all coxae, whereas all species within clade 3 have oblique impressions on at least coxae 4–6, and sometimes on the seventh (character 25). Another feature that distinguishes these two clades is the size and shape of the meral lobes on the first three pereopods (character 34). This lobe is only slightly produced in the species of clade 2, but markedly produced and recurved in the species of clade 3. This character is not included on either branch 2 or 3 in Fig. 3 because the reconstruction for branch 1 is equivocal, and thus the plesiomorphic vs. apomorphic state is ambiguous. It is, however, one of the most easily observed distinguishing features of these two clades (see couplet 4 of key).

The decay indices and bootstrap proportions generally correspond to the amount of change and number of synapomorphies present on each branch. The total change, number of uniquely derived synapomorphies, Bremer support (decay indices) and bootstrap proportions for each branch of the *Politolana sensu stricto* clade are listed in Table 1. The two main basal clades are the most strongly supported within the phylogeny by all measures. These clades have decay indices of 4 and 6, respectively. The bootstrap proportions are also the highest for these two clades: 86% for clade 2 and 99% for clade 3.

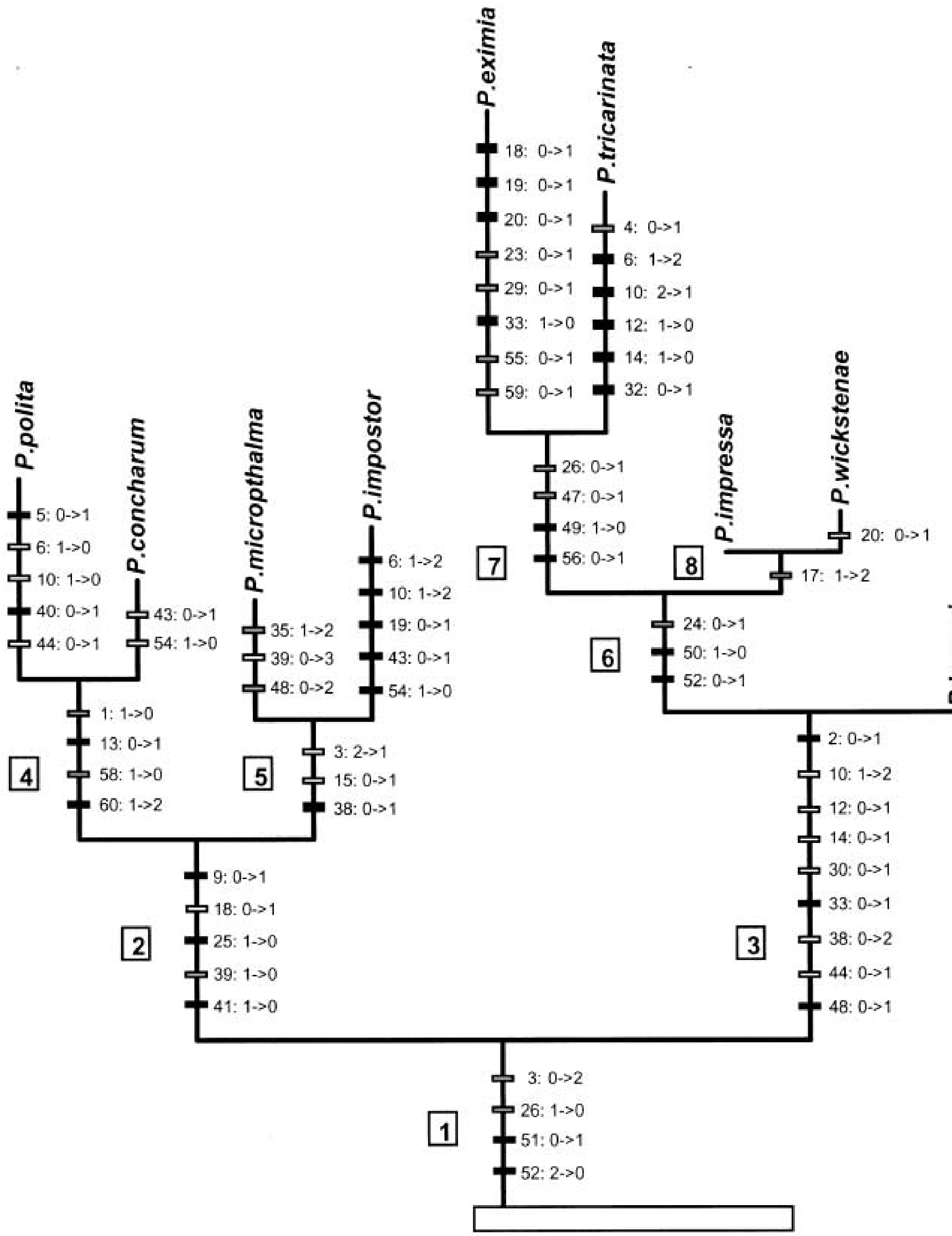

Figure 3. Unambiguous character change in *Politolana sensu stricto*, with branch lengths proportional to change. Branch numbers, referred to in the text, are indicated in the box to the left of the branch. Nonhomoplasious characters are marked with black bars, homoplasious characters are marked with white bars, and those characters that are homoplasious in the context of the entire phylogeny, but which are not homoplasious within *Politolana sensu stricto*, are marked by grey bars. The character number and direction of state change are given to the right of the bar and correspond to the character list (Appendix 1). This clade has a CI = 0.78, RI = 0.78 and RC = 0.61 (with uninformative characters removed).

One of the most significant results of the phylogenetic analysis, in terms of taxonomy, is that three of the in-group species (*P. crosnieri*, *P. dasyprion*, *P. obtusispina*) cluster with the out-group taxa rather than within *Politolana sensu stricto*. The remaining nine *Politolana* species cluster into a fully resolved and well-defined clade, the topology of which is identical in all three MPTs. These results clearly show that as cur-

Table 1. Measures of support for branches of *Politolana sensu stricto* (a monophyletic clade containing nine *Politolana* species, excluding the out-group genera and three outlying *Politolana* species: *P. dasyprion, P. obtusispina* and *P. crosnieri*)

Branch #	Synapomorphies	*b*	Distance	Bootstrap
1	2	1	4	68%
2	3	3	5	86%
3	3	6	8	99%
4	2	3	4	78%
5	1	2	3	71%
6	2	2	3	66%
7	2	2	4	69%
8	0	1	1	52%

Branch numbers correspond to Fig. 3. Synapomorphies include only those characters with a CI = 1; distance reflects the total amount of change on the branch, including homoplasious characters; *b* = Bremer support (decay index) of branch; bootstrap proportions are based on 1000 replicates, obtained with the heuristic search option in PAUP ver. 3.1.

rently defined *Politolana* is a paraphyletic taxon. *Politolana sensu stricto* represents a clade of morphologically very similar species that are united by unique synapomorphies, and this clade differs markedly from the outlying species. We therefore recommend that *P. crosnieri*, *P. dasyprion* and *P. obtusispina* be removed from *Politolana*.

At present we cannot suggest appropriate generic assignments for the three outliers. The genus-level family revision currently in preparation (by RCB) will define synapomorphies and relationships of the cirolanid genera and provide a basis for reassigning these outlier species. After the removal of these three taxa, *Politolana* stands as a monophyletic clade of nine species defined by the following four synapomorphies (the first of which is unique to the genus): a setal fringe on the lateral margins of pleonites 2–4; an interocular furrow (medially complete or incomplete); posteriorly produced epimeres on pleonites 1–4, or 1 and 4 only; lack of distinct oblique impressions on the seventh coxae. The last character reverses within *Politolana* such that two species (*P. eximia* and *P. tricarinata*) regain the impressions.

TAXONOMY

Material and Methods

The taxonomic treatments presented herein are based on examination of over 170 lots, comprising thousands of specimens, borrowed from the following institutions: The Australian Museum, Sydney (AM); The Natural History Museum, London (BMNH); Gulf Coast Research Laboratory, Ocean Springs, MS (GCRL); Los Angeles County Natural History Museum, Los Angeles (LACM); Harvard University, Museum of Comparative Zoology, Cambridge, MA (MCZ); Muséum National d'Histoire Naturelle, Paris (MNHN); Museum Victoria, Melbourne (MVic); Museu Nacional, Rio de Janeiro (NMB); the South African Museum, Cape Town (SAM); National Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM); Museu de Zoologia, Universidade de Sao Paulo, Sao Paulo (MZSP); Zoologisk Museum, Oslo (ZM); and the Zoologisk Museum, University of Copenhagen (ZMUC). In addition, the entire *Politolana* holdings at the USNM (over 350 lots) were examined subsequent to the taxonomic work to assign correct identifications to this material. These lots (see Appendix 4) are not included in the material examined sections of the species descriptions but their locality records were included in the biogeographical analysis.

We examined specimens of both sexes and from throughout the species' ranges for intraspecific variation. Numerous specimens for each species were fully dissected. Appendages were temporarily mounted in glycerin on regular or concavity slides and examined using a Nikon Labophot compound microscope. Most figures were made with the aid of a camera lucida (Wild M-5 dissecting microscope) or ocular grid (Nikon Labophot compound microscope). Scanning electron micrographs (SEMs) were taken with a Cambridge scanning electron microscope.

Researchers have long noted the confusion regarding terminology of crustacean morphological structures, the most notorious of which is setal terminology (Moore, 1953; Watling, 1989; Brusca *et al*., 1995). Because the issue has not yet been addressed in a comprehensive manner, we have kept setal terminology as simple as possible to avoid further confusion. We have named most setae by a combination of adjectives to describe length, robustness and complexity. A seta should be assumed to be simple unless otherwise noted.

Confusion has also arisen over the terminology used for pereopod orientation. Part of the confusion stems from the fact that the anterior pereopods (in the case of cirolanids, the three anterior legs) are directed forward, while the remaining pereopods are directed posteriorly. We follow Brusca *et al*. (1995), using the natural curvature of the pereopod to refer to the margin that is encompassed by the concave propodus and dactyl as the inferior margin, and the opposite (convex) margin as the superior margin. Cirolanid pereopods are flattened, weakly on the anterior three pereopods, and more so on the posterior four pereopods. This flattening results in two 'faces', or sides of the pereopod that we term the anterior face and the posterior face (anterior facing forward, posterior facing posteriorly). Thus each leg article can have an anterior distal margin and a posterior distal margin (Fig. 4). These fine distinctions are necessary to describe the complex setation of *Politolana* pereopods. In most cases, only a single side of the pereopod is figured and described, generally the more complex or setose side. Any unique setation on the unfigured side is noted in the descriptions. Similarly, we describe many features of pleon morphology, and the terminology used to describe the various regions is shown in Fig. 4. The following abbreviations are used: P1–P7, pereopods 1–7; PMS, plumose marginal setae; SEM, scanning electron micrography.

In the material examined sections, we use the following abbreviations for the collectors or donors of museum material: USFC, US Fisheries Commission; MMS/NEBP, Materials Management Service (Bureau of Land Management) New England Benchmark Program; VIMS/CABP, Virginia Institute of Marine Science, Central Atlantic Benchmark Program; TI/SABP, Texas Instruments, South Atlantic Benchmark Program. US States are listed by the following two letter codes: DE, Delaware; FL, Florida; MA, Massachusetts; ME, Maine; NC, North Carolina; NJ, New Jersey; NY, New York; RI, Rhode Island; SC, South Carolina; VA, Virginia.

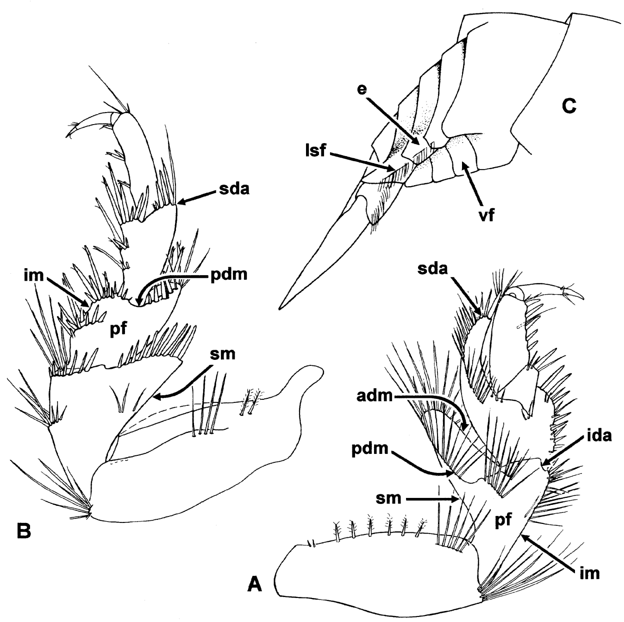

Figure 4. (A, B) Right pereopod 1 and right pereopod 4, respectively, showing orientation terminology used in the species descriptions and character list: sm, superior margin; im, inferior margin; pdm, posterior distal margin; adm, anterior distal margin; pf, posterior face; ida, inferior distal angle; sda, superior distal angle (produced into 'meral lobe' on pereopod 1). Pleon (C) showing terminology used to describe the different regions: e, epimeres; lsf, lateral setal fringe; vf, ventral flanges.

Taxonomic Treatment

Politolana generic diagnosis and description

Order Isopoda Latreille (1817)
Suborder Flabellifera Sars (1882)
Family Cirolanidae Dana (1853)
Politolana Bruce, 1981.

Synonymy. Bruce (1981a): 958–959, Figs 1(j), 1(k), 2(g), 2(h), 3(g), 3(h), 4(d), 5(g,h); Kensley & Schotte (1989): 140–143, Figs 63, 64; Wetzer *et al*. (1987): 1–11.
Type species. Aega polita Stimpson (1853) (by original designation).
Diagnosis. Long and cylindrical, 3–6.5× longer than wide, with unornamented and highly polished cuticle. Frontal lamina narrow, 4–5× longer than wide, greatly reduced in one species (*P. polita*). Antennules short, just reaching eyes. Antenna peduncle articles 3–5 subequal or progressively longer. Mandible molar process with submarginal row of lightly plumose setae on dorsal surface. Penes long (relative to most other genera in the family), slightly flattened, not fused basally. Pleonites 2–4 with fringe of fine biplumose setae along lateral margin of epimeres; pleonites with produced ventral flanges. Pereopods 1–3 robust and ambulatory, with superior distal angles of merus and carpus moderately or greatly produced; highly setose. Dactyl with small blunt secondary unguis. Pereopods 4–7 strongly flattened. Pereopod 7 with merus and carpus distally expanded, bearing dense clusters of setae. Pleopod 1 peduncle subquadrate, or with length slightly less than width, wider than long in *P. eximia*; pleopod 1 endopod width less than exopod width. PMS present on all pleopod rami except endopod of pleopod 5. Uropod peduncle medial margin produced distally; lateral margin with setal fringe; uropod endopod of adults with notch in distolateral margin, notch lacking PMS but housing a small palmate seta.
Description. Body 3–6.5× longer than wide, generally of long cylindrical form with lateral margins subparallel in dorsal view; cuticle highly polished, without spines, tubercles or setae; with or without scattered chromatophores on pereon and pleon.
Cephalon: Cuticle polished or lightly textured, sometimes minutely punctate; wider than long, laterally enclosed to eyes by pereonite 1; anterior margin medially concave, convex or straight; with or without distinct rostral point; with cuticle of frontal margin raised into thickened ridge, lateral margins reaching

or dividing eyes. Interocular furrow present, not always complete. Eyes present or reduced to remnant ommatidia; cuticle overlying eyes typically without facets or with slight facets marking ommatidia; eyes usually darkly pigmented. Frontal lamina narrow, typically 4–5× longer than wide, or highly reduced (Figs 5 and 6D); not fused to rostrum; with or without raised margins; posterior margin abutting clypeus, not projecting. Clypeus not projecting; subtriangular, width greater than length; with or without raised lateral margins; curved around lateral margins of labrum. Labrum wider than long, posterior margin slightly concave.

Antennule: Short, usually reaching eyes. Peduncle of four articles: articles 1 and 2 short, article 3 longest; article 4 minute with one or few anterolateral setae; article 2 posterior distal angle usually bearing short palmate setae. Flagellum length subequal to peduncle length, of 8–15 articles, each with numerous aesthetascs; first flagellar article longest.

Antenna: Peduncle of five articles, articles 1 and 2 shortest, wider than long, articles 3–5 subequal or progressively longer; posterior distal margins of peduncle articles 4 and 5 with or without long stiff simple setae; flagellum of 10–22 articles, with clusters of short fine setae on distal angles.

Mandible: Incisor teeth of left mandible less robust than on right mandible. Molar process and setal row well developed; setal row with about 12–16 robust setae; molar process with short spines along entire anterior margin; with submarginal row of lightly plumose setae on dorsal surface; molar process surface typically covered with short fine setae. Palp article 2 longest, with dense row of simple and serrate setae; article 3 shortest, narrowing distally, with simple and slender serrate setae.

Maxillule: Lateral lobe with minute bifid setae along medial margin; gnathal surface with approximately 11 heavily sclerotized robust setae, several anterior ones with notched surface. Medial lobe with three giant

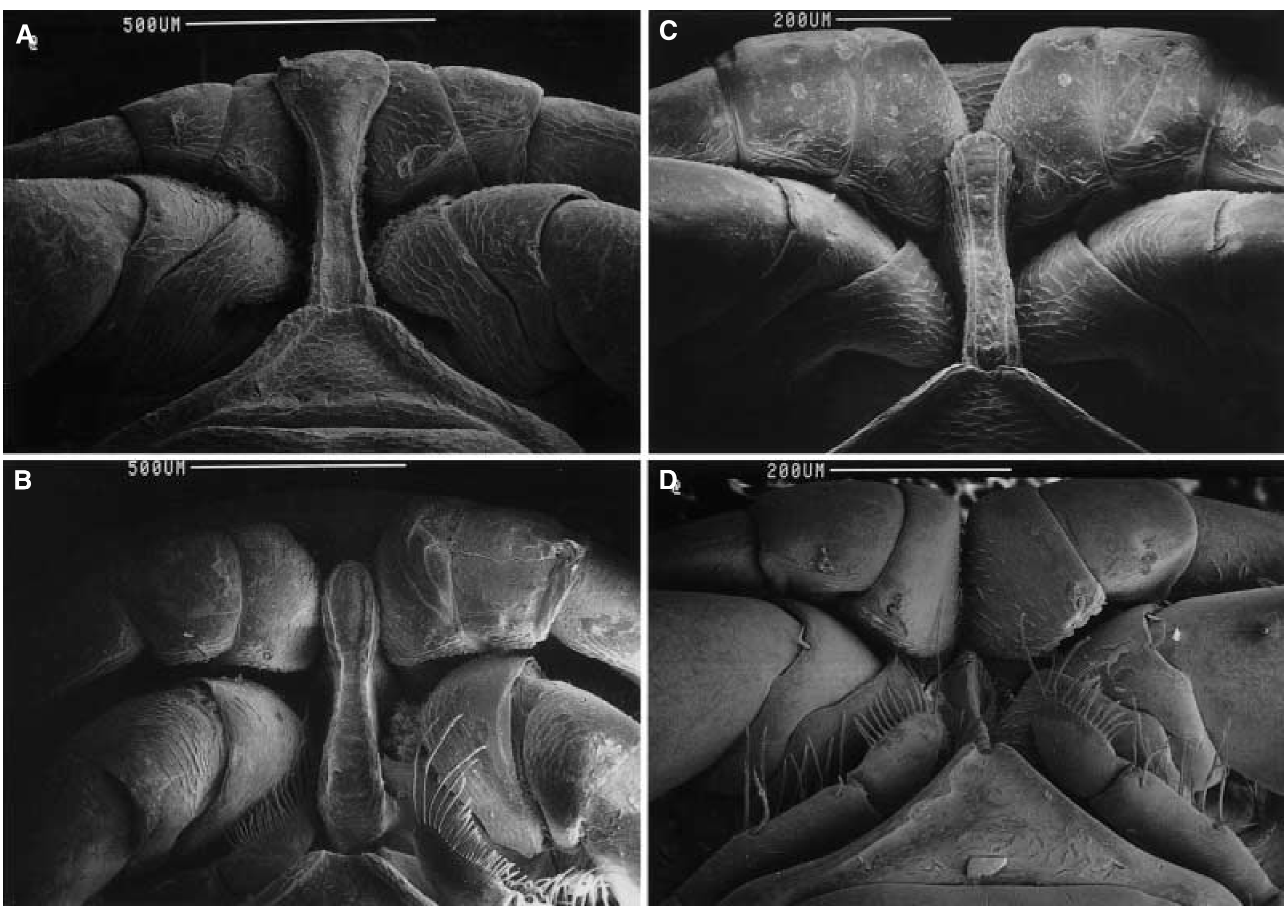

Figure 5. Scanning electron micrographs showing frontal lamina morphologies: (A) *P. impostor* (USNM#34512, female); (B) *P. wickstenae* (LACM#3012, female); (C) *P. impressa* (GCRL#1354, male); (D) *P. polita* (USNM#191877).

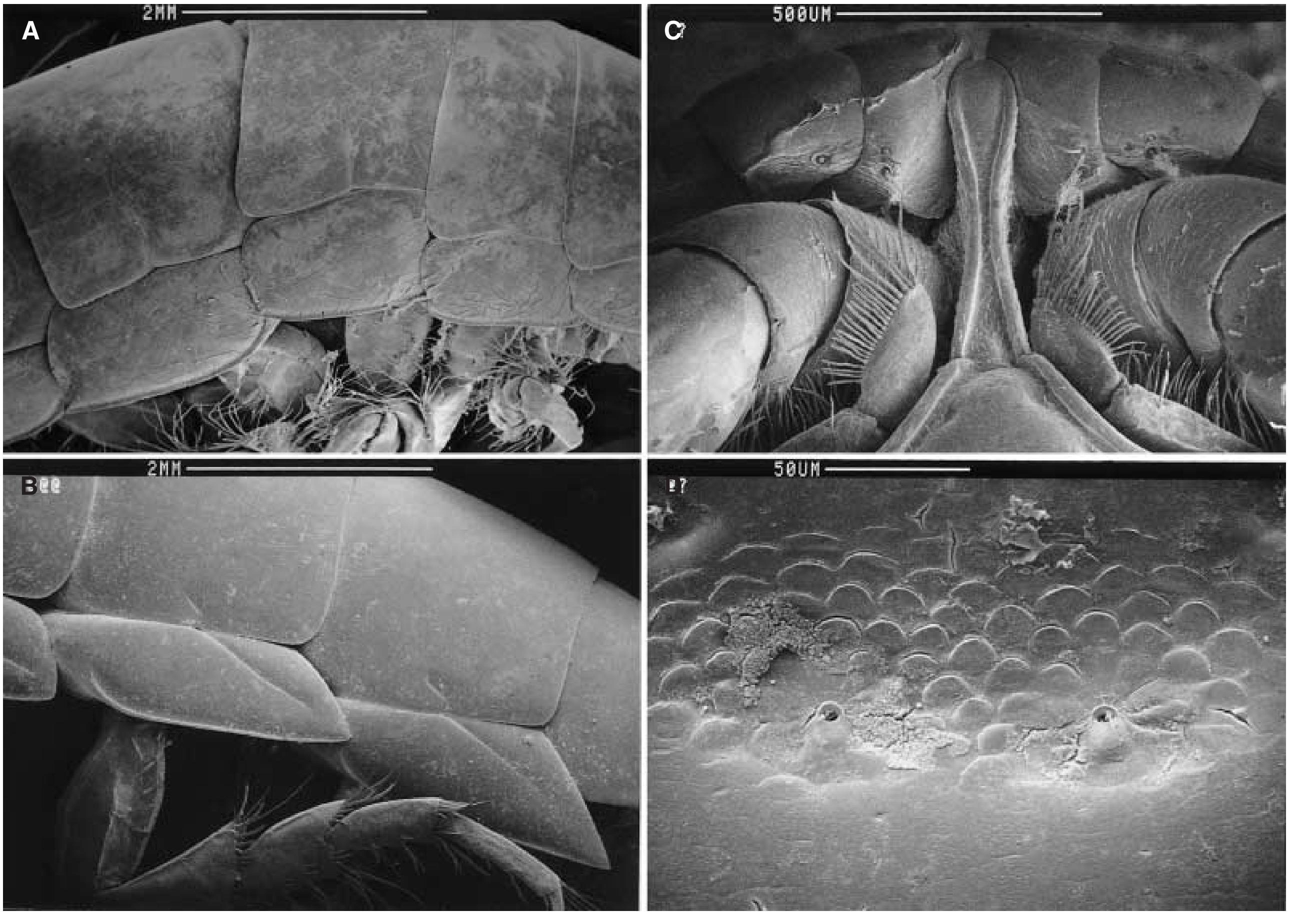

Figure 6. Scanning electron micrographs showing coxae with and without lateral oblique impressions: (A) *P. concharum* without impressions (USNM#38224, male); (B) *P. haneyi* with impressions (USNM#288403); (C) frontal lamina of *P. concharum* (USNM#3871, male); (D) scanning electron micrograph of *P. polita* showing detail of the dorsal medial depression housing two minute pores with sensilla (MCZ#6944).

circumplumose setae and smaller robust plumose seta between two proximal-most giant setae.

Maxilla: Middle and lateral lobes free and articulating, with long simple and lightly plumose setae; medial lobe with long plumose setae.

Maxilliped: Endite with robust circumplumose setae; with 1–3 coupling hooks, typically two on each endite. Palp of five articles, lateral and medial margins with simple setae, medial margins of distal articles also with serrate setae.

Pereon: Pereonites with dorsal medial pore pair, usually set in small round depression in textured cuticle (Fig. 6C). Pereonite 1 anterolaterally produced and encompassing head, with impression along lateral margin; lateral margins of pereonites 4–7 with small medial excision. Coxae not forming sternal plates; coxae 2 and 3 posteriorly rounded, not extending past posterior margins of respective pereonites; coxae 4–7 with posterior margins increasingly acute and extended, with or without oblique impressions (Fig. 6A,B).

Pleon: Of five free segments, posterolateral angles of pleonite 5 covered by pleonite 4, or slightly visible; cuticle often more textured than pereon; pleonite epimeres laterally and posteriorly produced to varying degrees; pleonites 2–4 with fringe of fine biplumose setae along lateral margin of epimeres (Fig. 7); pleonites with produced ventral flanges.

Pleotelson: Length usually subequal to width, surface without setae, tubercles, pits or ridges; posterior margin with PMS, with or without robust setae, without spines.

Pereopods 1–3: Ambulatory, robust, highly setose. Basis with long simple setae on distal inferior angle and in submarginal row extending proximally from superior distal angle; superior margin with at least a few palmate setae (Fig. 8C). Ischium with 1–3 oblique rows of simple setae on posterior face; inferior margin

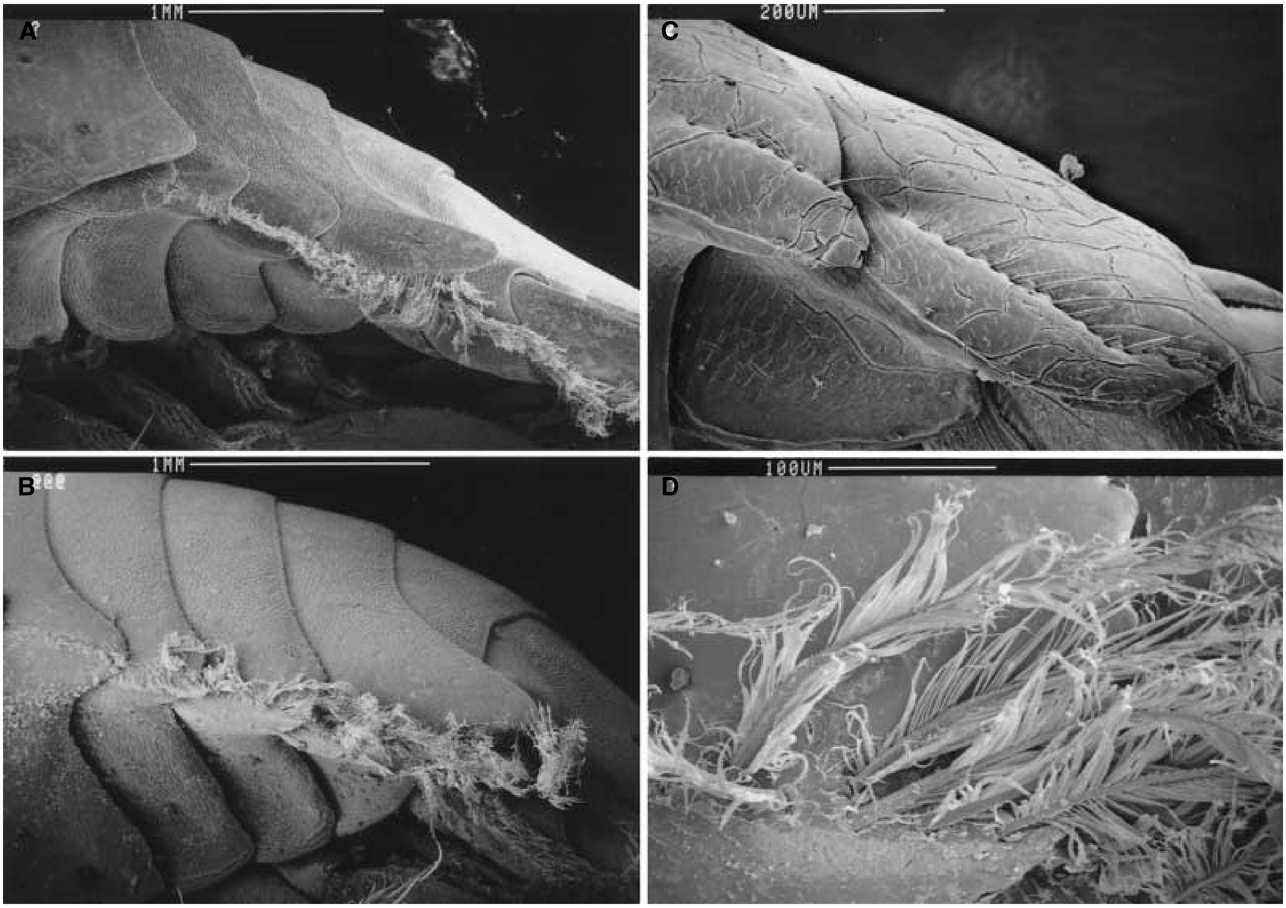

Figure 7. Scanning electron micrographs showing the synapomorphic fringe of biplumose setae present on the lateral margins of the pleon. (A) *Politolana impressa* (GCRL#1354, male); (B, D) *P. haneyi* (USNM#288403); (C) *P. concharum* (USNM#38224, male), showing a less dense setal row on pleonites 4 and 5 (the setae shown in this SEM are damaged, but remnants of the plumosity can be seen on the posterior-most setae of the fringe).

with long simple setae; superior distal angle produced as scoop-shaped lobe with long simple marginal setae, degree of production varies. Merus superior distal angle moderately to greatly produced, with giant robust apical setae and marginal row of long simple or robust setae; inferior margin of merus and carpus setose. Propodus with row of simple setae on superior margin. Dactyl with small, blunt secondary ungui. Pereopod 1 propodus with simple seta inserted on mid-anterior face (Fig. 9).

Pereopods 4–7: Longer and more slender than P1–P3, flattened on anterior-posterior plane. Posterior face of merus and carpus with numerous short robust setae (Fig. 8A). Pereopod 7 with distal angles of merus and carpus expanded, bearing dense clusters of setae; P7 propodus shorter than P6 propodus.

Pleopods: Pleopod 1 peduncle subquadrate, or with length only slightly less than width (except *P. eximia*); endopod width less than exopod width, PMS on distal margin only; exopod with PMS on distal and lateral margins, medial margin bare. Pleopods 2–4 peduncle wider than long; endopod width less than exopod width, with PMS on distal margin, medial and lateral margins bare (males with PMS on medial margin of pleopod 2); exopod with PMS on entire margin or with medial margin bare. Appendix masculina arising sub-basally on endopod of pleopod 2, reaching to or beyond distal margin of exopod; narrow and evenly tapering or lanceolate in form. Pleopod 5 with reduced peduncle, without coupling hooks; endopod with large proximomedial lobe, without PMS; exopod large, with PMS on entire margin.

Uropods: Peduncle with lateral setal fringe extending onto ventral distal margin; medial margin produced distally. Endopod of adults with notch in distolateral margin, shallow or deeply excised, usually housing short palmate seta, with short robust seta lateral to notch; endopod with PMS except in region of medial

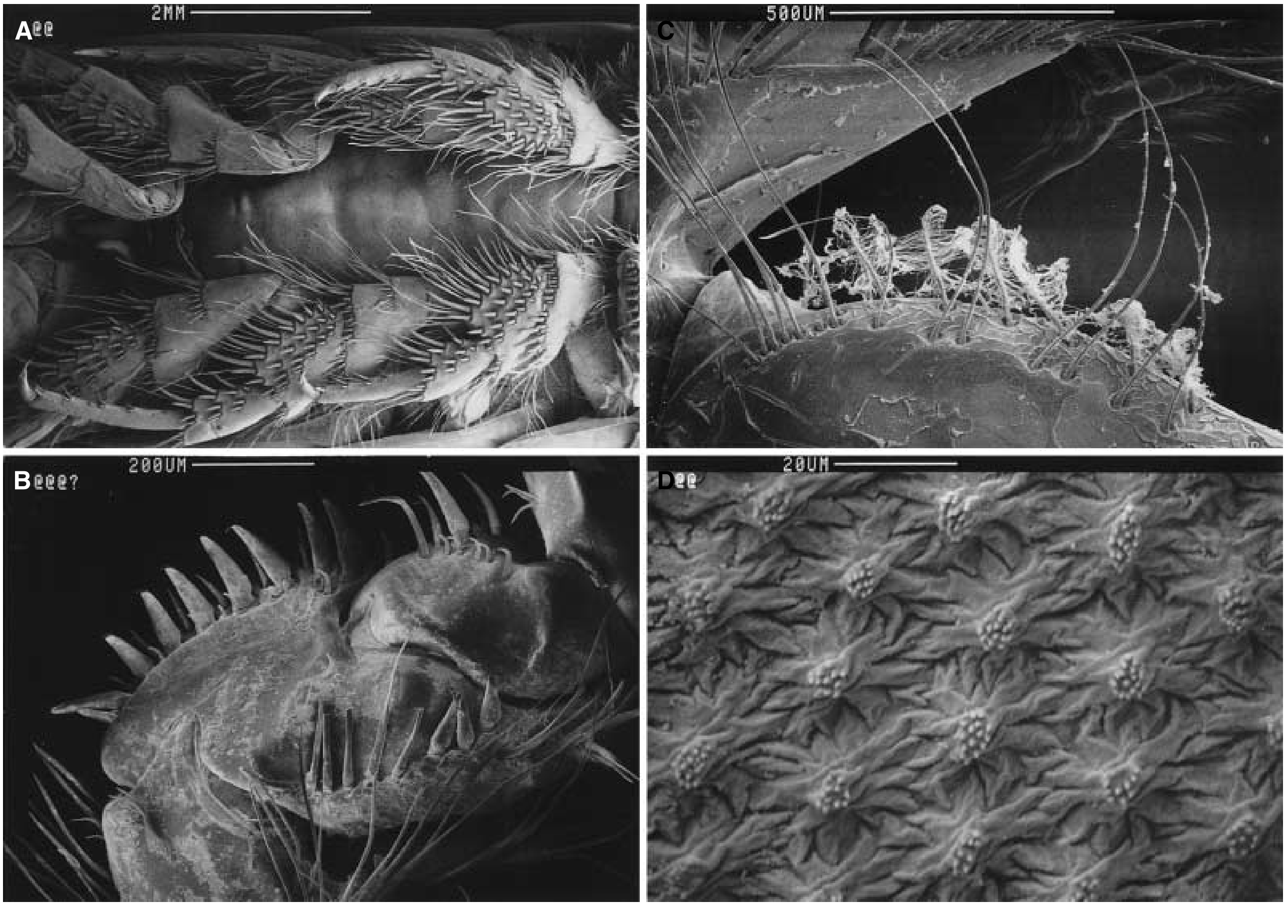

Figure 8. Scanning electron micrographs showing pereopod and cuticle morphology. Ventral aspect of *P. concharum* (USNM#3871, male) showing (A) pereopods 4–7 and (D) detail of cuticle on ventral mid-line; (B) *P. polita* pereopod 2 merus (MCZ#6944, male); (C) palmate setae on superior margin of pereopod 2 basis in *P. concharum* (USNM#38224, male).

notch, shape and additional setation varies; with palmate setae on proximal dorsal surface. Exopod with PMS; shape and additional setation varies.

Remarks. The lateral setal fringe on the pleon is a synapomorphic feature unique to *Politolana sensu stricto* and is in itself diagnostic. This setation pattern has been figured and mentioned by some authors although its potential as a diagnostic feature of the genus had not been recognized. While some other species of Cirolanidae exhibit setation on one or more pleonal segments, these conditions are not homologueous with the lateral setal fringe of *Politolana*. The other setation occurs on a different area of the epimere (such as the ventral margin), is not biplumose and/or does not occur as a continuous fringe extending through the fourth pleonite. *Politolana* can also be identified by the unique combination of characters given in the diagnosis. Among these additional characters, the excision or notch in the distolateral margin of the uropod endopod is quite distinct in adult *Politolana* specimens, but less developed in juveniles. While the notch is less excised in *P. polita* and *P. micropthalma*, the uropod setation pattern is identical, with PMS present proximal and distal to the notch but absent in the region of the excision, and with a palmate seta set within the notch. This notch and associated setation pattern are present in all *Politolana* species, but are not unique to the genus and also occur in at least some species of *Orphelana* and *Natatolana*. The presence of small secondary ungui and the varying lengths of the antennal peduncle articles disagree with the diagnosis given for subfamily Conilerinae in which *Politolana* was included (Kensley & Schotte, 1989).

The phylogenetic analysis, discussed in the previous section, revealed three species as not belonging to the clade containing the rest of the *Politolana* species. These outlying species are not described here, but are included in the key for the sake of completeness. Couplets that distinguish phylogenetic clades are noted within the key. Brusca & Wilson (1991) suggested that the minute fourth article of the antennule might not be peduncular, but on the basis of its setation pattern we herein regard it as part of the peduncle.

Species included in *Politolana sensu stricto:*

Politolana concharum (Stimpson, 1853). North-west Atlantic

Politolana eximia (Hansen, 1890). South-west Atlantic

Politolana haneyi n.sp. Gulf of Mexico and Gulf of California

Politolana impostor n.sp. North-west Atlantic

Politolana impressa (Harger, 1883). North-west Atlantic, Gulf of Mexico

Politolana micropthalma (Hoek, 1882). North-east Atlantic, Barents Sea

Politolana polita (Stimpson, 1853). North-west Atlantic

Politolana tricarinata Riseman *et al*., 2001. South-west Atlantic

Politolana wickstenae Wetzer *et al*., 1987. Gulf of Mexico

Species excluded from *Politolana sensu stricto:*

Politolana crosnieri Bruce, 1996. New Caledonia

Politolana dasyprion Bruce, 1991. Bass Strait, Australia

Politolana obtusispina (Kensley, 1975). Still Bay, South Africa

Key to the species of Politolana

1. Frontal lamina wide and pentagonal; without lateral fringe of biplumose setae on the pleonite epimeres, but may have simple setae on ventral margins of epimeres, or setae confined to the third pleonite (non-*Politolana sensu stricto*). 2

— Frontal lamina narrow and blade-like (length about 4–5 × width), or highly reduced; with lateral fringe of biplumose setae on the pleonite epimeres (*Politolana sensu stricto*). 4

2. Antennule flagellum longer than peduncle, reaching fifth pereonite; ventral margins of coxal plates and pleonite epimeres with short stiff simple setae; antennule peduncle article 2 length 2 × width . . *P. crosnieri*

— Antennule flagellum shorter than, or subequal to peduncle length, usually reaching eyes; ventral margins of coxal plates and pleonite epimeres without short stiff simple setae; antennule peduncle article 2 length subequal to width 3

3. Dorsal surface of pereonites with medial transverse cuticular ridge; with complete interocular furrow; pereopod dactyls with small blunt secondary ungui; uropod exopod flat and broad, length about 2 × width, shorter than endopod; pleotelson posteriorly acute . . . . *P. obtusispina*

— Dorsal surface of pereonites without transverse cuticular ridges; without interocular furrow; pereopod dactyls with long narrow secondary ungui; uropod exopod narrow, length more than 5 × width, subequal in length to endopod, curving laterally; pleotelson posterior margin narrow and emarginate . . . . *P. dasyprion*

4. Pereopods 1–3 with superior distal angle of merus produced into a large recurved lobe reaching beyond midpoint of the propodus and equal to half length of article; coxae 4–6 with distinct or weak oblique impressions; cuticular ridge of cephalon frontal margin laterally reaching and dividing eyes (clade 3) 8

— Pereopods 1–3 with superior distal angle of merus produced into a small lobe just reaching base of the propodus and only 1/4 length of entire article; coxae 4–6 without oblique impressions; cuticular ridge of cephalon frontal margin laterally reaching, but not dividing eyes (clade 2) 5

5. Frontal lamina greatly reduced to small ridge sitting deep between the antennae; ventral margin of eyes with fringe of simple setae; setation of antenna 2 peduncle dense, article 5with cluster of about 15 stiff simple setae. . . . . *P. polita*

— Frontal lamina narrow, length about 4–5 × width; ventral margin of eyes without fringe of simple setae; antenna 2 peduncle article 5 with cluster of about six or fewer stiff simple setae. 6

6. Pleotelson posterior margin broadly convex and posteriorly emarginate (except in smallest individuals), with four robust setae (two on each side of emarginate region); uropod exopod length subequal to endopod length, narrow and rounded, with large apical seta . . . . *P. concharum*

— Pleotelson posterior margin evenly convex, or narrowly truncate, without large robust setae; uropod exopod shorter than endopod, flattened with convex lateral margins. 7

7. Antennae 2 reaching middle of pereonite 2; pleon ventral epimeres with ventral posterior angle produced into a fine point; pleotelson posterior margin evenly convex; pereopod 4 propodus with sparse setae on superior margin . . . . *P. impostor* n.sp.

— Antennae 2 reaching middle of pereonite 1; pleon ventral epimeres with ventral posterior angle blunt or rounded; pleotelson posterior margin narrowly truncate; pereopod 4 propodus without setae on superior margin . . . . *P. micropthalma*

8. Pereon-pleon articulation loose, with pereonite 7 overhanging and overlapping first and sometimes second pleonites; dorso-ventrally narrower than pereon such that epimeres are laterally flared and do not obscure the ventral flanges; uropod endopod apex broadly rounded or truncate, apex with or without cluster of long simple setae; pleotelson posterior margin slightly subacute or medially produced into an acute point 9

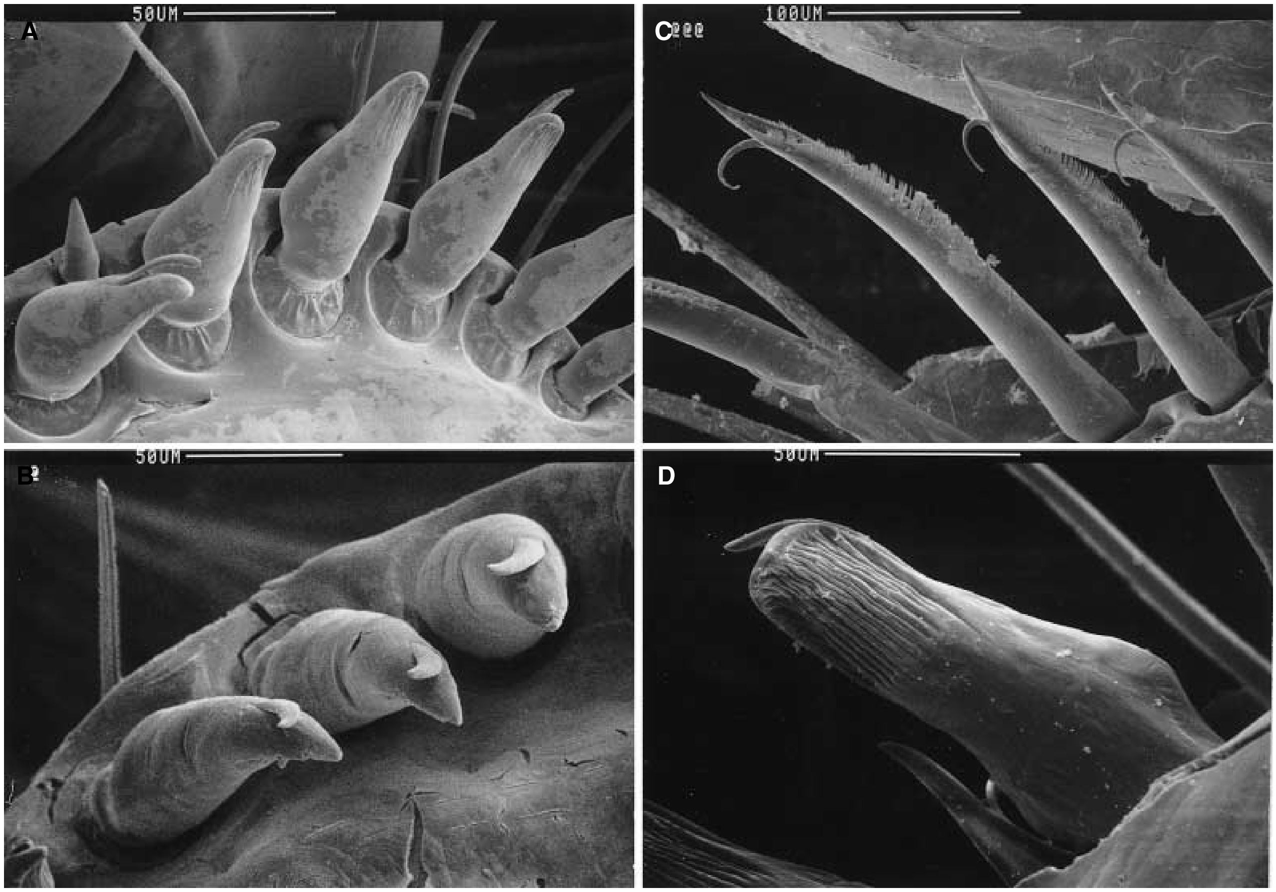

Figure 9. Scanning electron micrographs of some different types of pereopod setae. Distally blunt, flattened and textured setae on inferior margin of merus of pereopods 1–3 in (A) *P. polita* (P2, USNM#191877) and (D) *P. concharum*: (P2, USNM#38224); (B) blunt robust setae on inferior margin of merus of pereopods 1–3 in *P. impostor* (P3, USNM#34512); (C) *P. haneyi* pereopod 6 showing studded-biserrate setae on posterior distal margin of ischium (USNM#288304).

— Pereon-pleon articulation tight, with first pleonite visible, not completely overlapped by pereonite 7; pleon dorso-ventrally vaulted similar pereon such that ventral flanges obscured by dorsal epimeres; uropod endopod apex subacute, with distomedial margin slightly concave, apex with cluster of long simple setae; pleotelson posterior margin evenly and narrowly convex . . . . *P. haneyi* n.sp.

9. Uropod exopod long, reaching beyond endopod, lateral margins relatively straight, tapering evenly; pereonite 1 anterolateral margin sinuate, forming acute anterior point; pleotelson posterior margin medially produced into acute point; P5–P7 with posterior distal margin of ischium bearing simple acute robust setae; pleopod 1 peduncle width nearly twice length; pleopod 1 endopod width greater than half the width of exopod . . . . *P. eximia*

— Uropod exopod shorter than or subequal to endopod, with lateral margins slightly convex; pereonite 1 anterolateral margin straight, forming rounded or blunt anterior angle; P5–P7 with posterior distal margin of ischium bearing studded-biserrate setae; pleopod 1 peduncle subquadrate, or with length only slightly less than width; pleopod 1 endopod width about one half width of exopod 10

10. Cephalon with additional transverse cuticular ridge between frontal ridge and the interocular furrow; pereopod 7 coxae with distinct oblique impressions; antennae 2 not reaching second pereonite; frontal lamina narrow, usually spatulate (anteriorly widened); pleotelson posterior margin with PMS and four small robust setae; P4–P7 with posterior distal margin of ischium bearing studded-biserrate setae . . . . *P. tricarinata*

— Cephalon without transverse cuticular ridge between frontal ridge and the interocular furrow; pereopod 7 coxae with or without residual oblique impressions, never complete and distinct; antennae 2 reaching second pereonite; frontal lamina narrow with slight hourglass shape or evenly wide; pleotelson

posterior margin with PMS, with or without minute robust setae; studded-biserrate setae absent on posterior distal margin of P4 ischium, present on ischia of P5–P7 11
11. Eyes present, darkly pigmented *P. impressa*
— Eyes absent . . . . *.P. wickstenae*

Description of ***P. impostor n.sp.*** *(Figs 10–15)*
Synonymy. Cirolana polita of: Harger (1883): pl. 1, Figs 1, 1(c), pl. 2, Figs 2, 2(b); Richardson (1905): Figs 80, 81; Menzies & Frankenberg (1966): 18, 50–51, Fig. 26; Schultz (1969): Fig. 285; Kussakin (1979): 205–206, Figs 83, 84; Kensley & Schotte (1989): 140–143, Figs 63, 64.
Holotype. Female, USNM#288404: col. by L. Watling, sta. B2, 27 June 1988.
Type locality. Outer Sheepscot Bay, ME, 43°43.2′N, 69°43.5′W, 33.5 m.
Paratypes. MCZ#6853: Provincetown, MA; 1 female. USNM#34512: off Newport, RI, 24–35 m, col. by Usfc, R/V Fishhawk, sta. 793–799; 3 females (1 gravid). USNM#63743: Aspy Bay, Nova Scotia, col. by Biol. Board of Canada, Cheticamp Ex., 27 July 1917; 2 females, 2 males. USNM#236219: Gulf Stream, otter trawl, col. by J.A. Musick, R/V Eastward, sta. 31, May 1972; 1 male. USNM#253289: Woods Hole, MA; 1 spec.

Series of specimens from off NJ, col. by CABP/VIMS— USNM#191818: 39°24.12 N, 73°06.12 W, 66 m, sta. Bs6, 15 November 1976; 1 male. USNM#191873, 38°45.12 N, 73°25.12 W, 76 m, sta. E2, 11 August 1977; 4 spec.

Series of specimens from Georges Bank, col. by NEEB/Mms/BLM—USNM#214321: 40°41.05 N, 67°35.27 W, 86 m, sta. 13, 30 August 1977; 1 spec. USNM#214322: 40°41.24 N, 67°35.58 W, 84 m, sta. 13, 30 August 1977; 1 spec.

Series of specimens from outer Sheepscot Bay, ME, col. by L. Watling—USNM#288405: 43°43.2′N, 69°43.5′W, 33.5 m, sta. B2, 27 October 1988; 1 spec. (missing posterior half). USNM#288406: 43°33.3′N, 69°43.5′W, 31.5 m, sta. B5, 9 August 1988; 1 juvenile.
Additional material examined. Research Collection of L. Watling (University of Maine): outer Sheepscot Bay, ME, 43°43.4′N, 69°43.6′W, 29 m, col. by L. Watling, sta. B3, 13 June 1988; 1 juvenile (+2 *P. polita*).
Diagnosis. Body vaulted, pereon and pleon convex and tightly articulated. Coxae broad, lacking oblique or lateral impressions; length of coxae 7 slightly less than length of coxae 6. Frontal lamina narrow, usually spatulate: widened anteriorly, visible in dorsal aspect projecting between antennular peduncles. Lateral margins of frontal ridge reaching but not dividing eyes. Interocular furrow medially incomplete. Eyes subquadrate, darkly pigmented. Antennae reaching middle of second pereonite. Mandible molar process with numerous spines on anterior margin, touching at their bases. Pleon ventral flanges with ventral posterior angles produced into fine points. Pereopods 1–3 with superior distal angles of ischium and merus moderately produced; inferior margin of merus with long blunt robust setae; ischium superior margin with sparse simple setae. Pereopod 4 propodus with sparse simple setae on superior margin. Uropod peduncle ventral distolateral angle with acute robust seta; endopod distal margin broadly truncate; exopod shorter than endopod, peltate in shape, apex with robust seta and one or two short simple setae. Pleotelson posterior margin narrowly convex, with PMS and four small robust setae.
Description of holotype. Female, 13 mm long; body broad, length about 3.5× width; pereon cuticle highly polished; cream colour in alcohol with chromatophores on pereon, pleon and pleotelson.
Cephalon: Minutely punctate. Anterior margin medially straight with distinct medial point; lateral margins of raised frontal ridge reaching but not dividing eyes. Interocular furrow incomplete medially. Eyes subquadrate, darkly pigmented. Frontal lamina narrow, length about 4 × greatest width, anteriorly widened and spatulate, visible in dorsal aspect projecting between antennular peduncles; with lateral margins only slightly or not raised into thickened ridges. Clypeus with lateral margins raised as thickened ridges.
Antennule: Peduncle cuticle with microscopic ovate macula; articles with numerous short palmate setae on distal angles. Flagellum composed of eight articles, each bearing about 3–5 aesthetascs, some articles with additional cluster of short setae; first flagellar article longest, length subequal to width, width of subsequent articles about twice length.
Antenna: Reaching middle of second pereonite; peduncle articles 3 and 4 subequal in length, five longest; article 3 length subequal to width, widening slightly distally; article 4 subquadrate, posterior distal angle bearing row of approximately 10 long stiff simple setae; article 5 length about twice width, posterior distal angle bearing five long stiff simple setae. Flagellum composed of 16 articles.
Mandible: Molar process medial surface and distal posterior margin with fine setae organized into small shingle like rows; spines on anterior margin numerous, closely spaced, touching at their bases; submarginal setal row dense, with long lightly plumose setae extending from proximal cluster.
Maxilliped: Endite with distal cluster of approximately five robust circumplumose setae; right and left endites with two coupling hooks. Basis and palp article 1 with submarginal cluster of 2–3 long simple setae on distolateral angle.

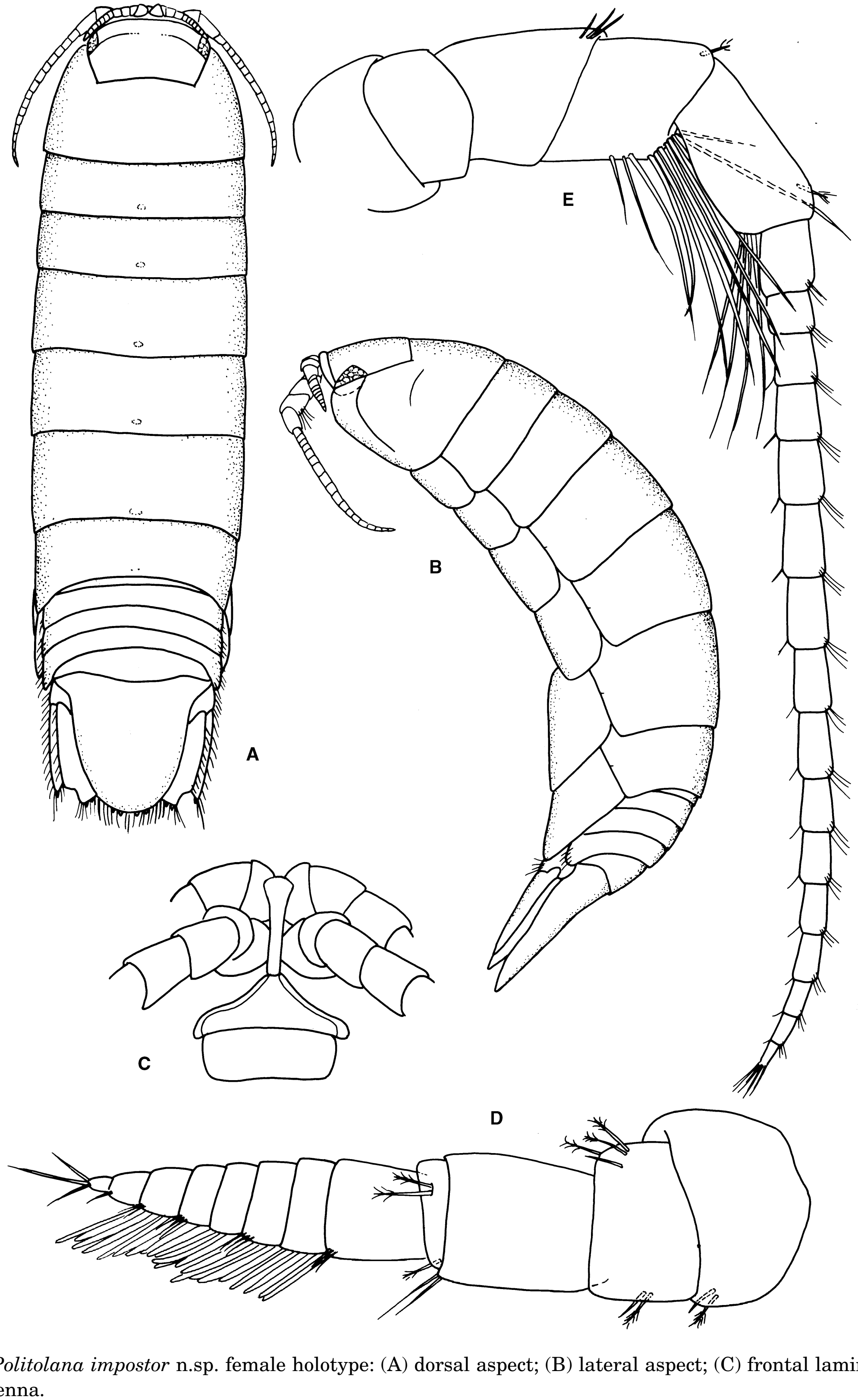

Figure 10. *Politolana impostor* n.sp. female holotype: (A) dorsal aspect; (B) lateral aspect; (C) frontal lamina; (D) antennule; (E) antenna.

Figure 11. *Politolana impostor* n.sp. female holotype: (A) right maxilliped; (B) maxilla; (C) right mandible; (D) maxillule; (E) right uropod.

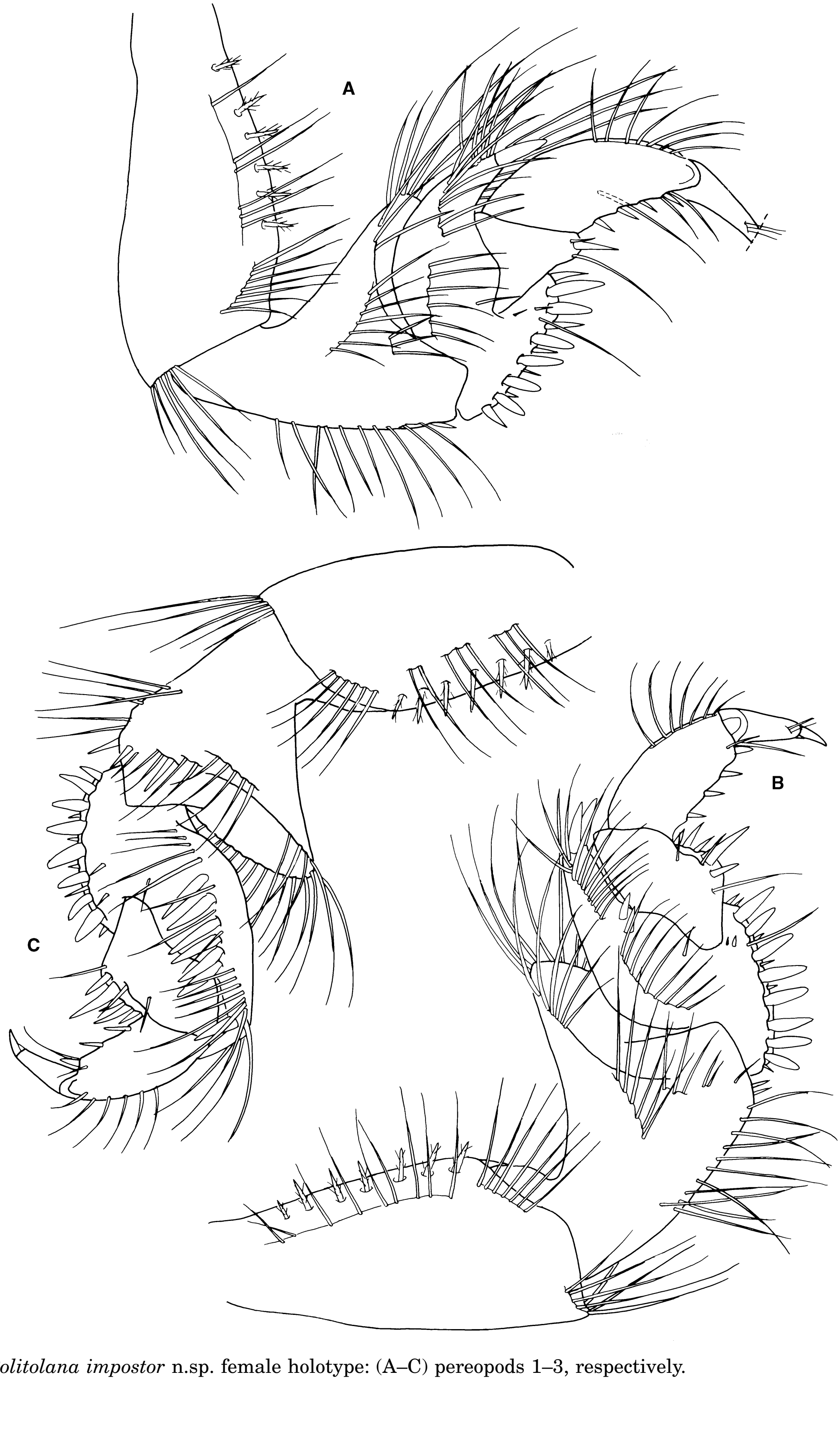

Figure 12. *Politolana impostor* n.sp. female holotype: (A–C) pereopods 1–3, respectively.

Figure 13. *Politolana impostor* n.sp. female holotype: (A, B) pereopods 4 and 5, respectively.

Figure 14. *Politolana impostor* n.sp. female holotype: (A, B) pereopods 6 and 7, respectively.

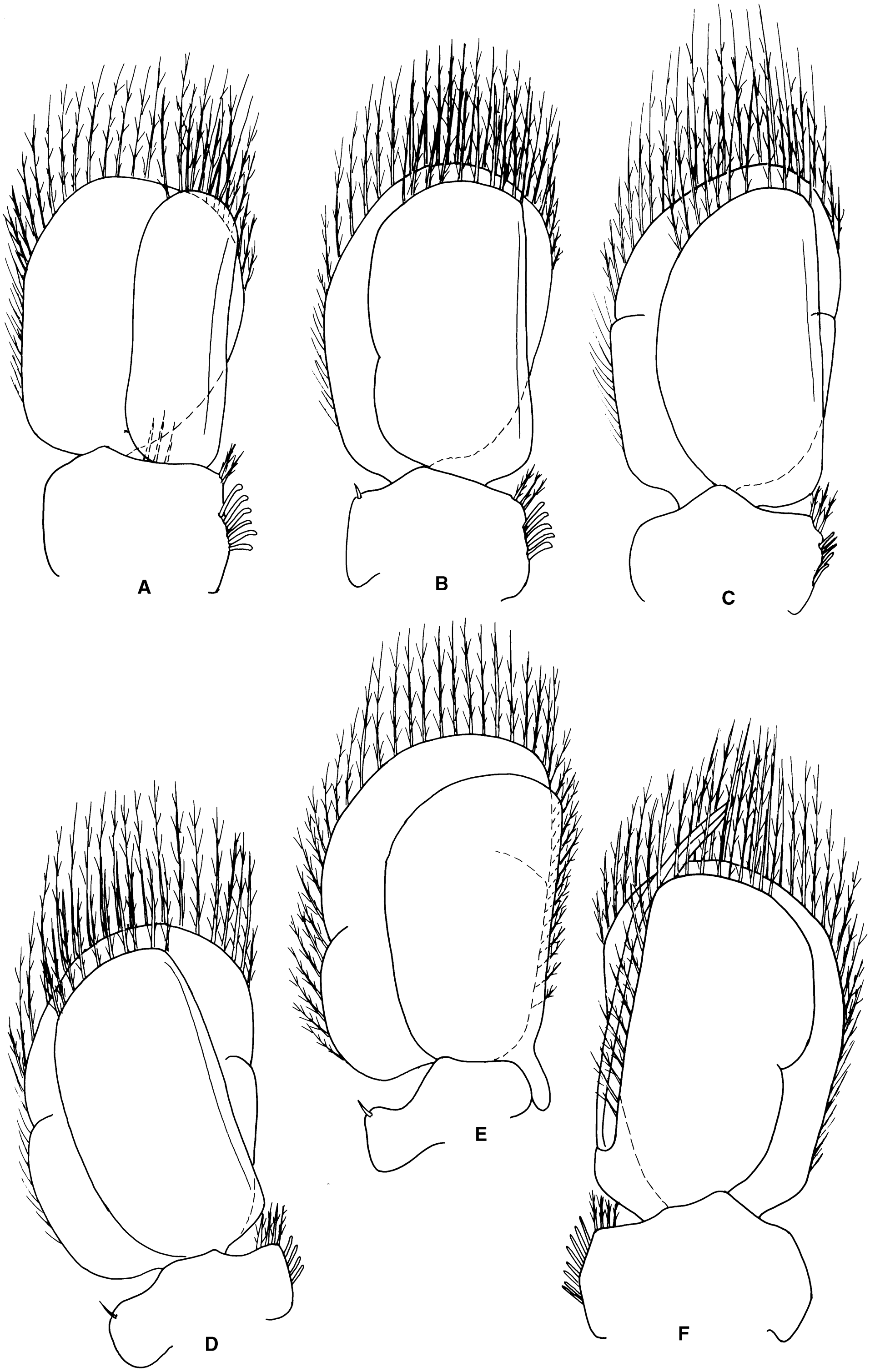

Figure 15. *Politolana impostor* n.sp. female holotype: (A–E) pleopods 1–5, respectively. *Politolana impostor* male: (F) pleopod 2.

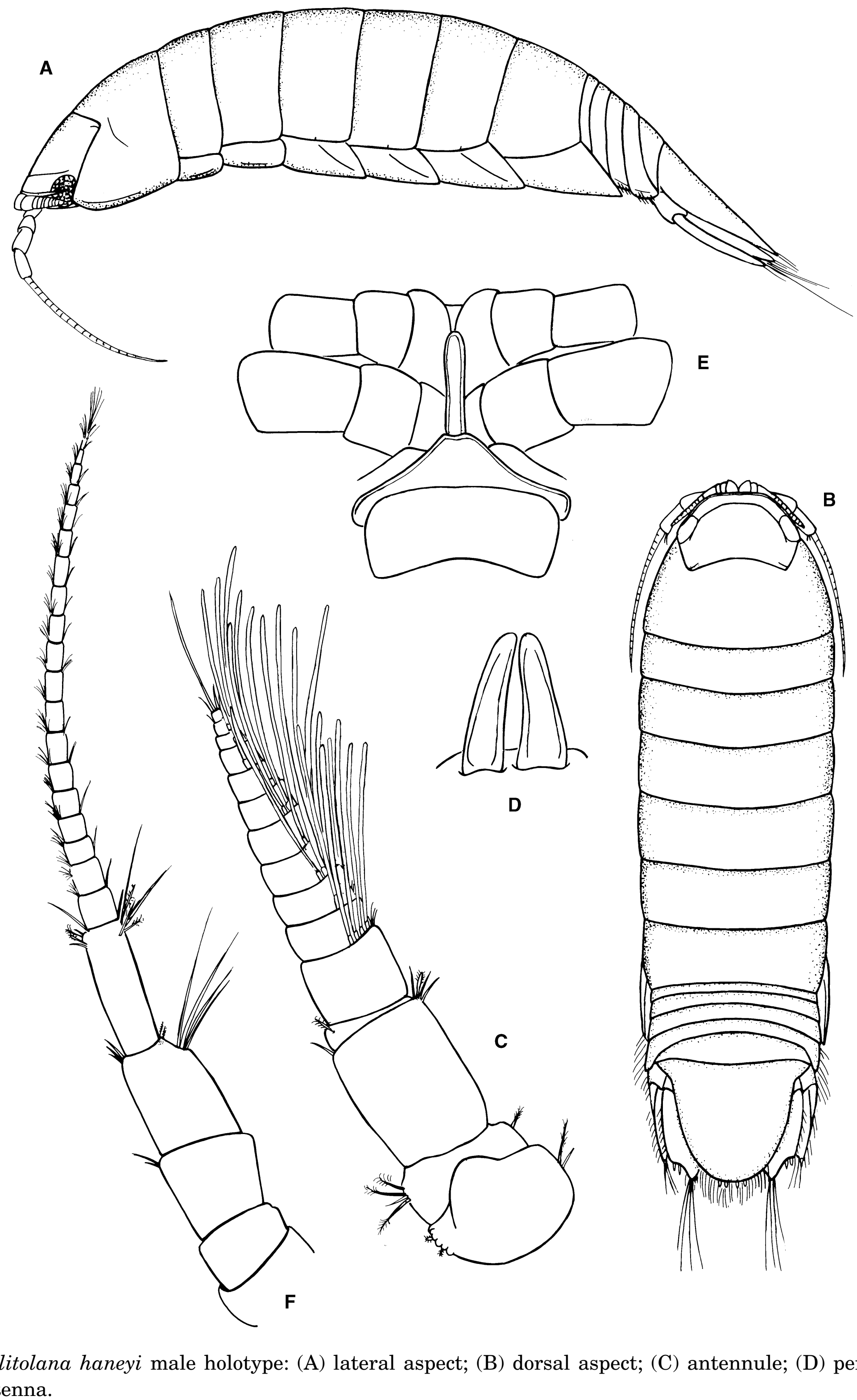

Figure 16. *Politolana haneyi* male holotype: (A) lateral aspect; (B) dorsal aspect; (C) antennule; (D) penes; (E) frontal lamina; (F) antenna.

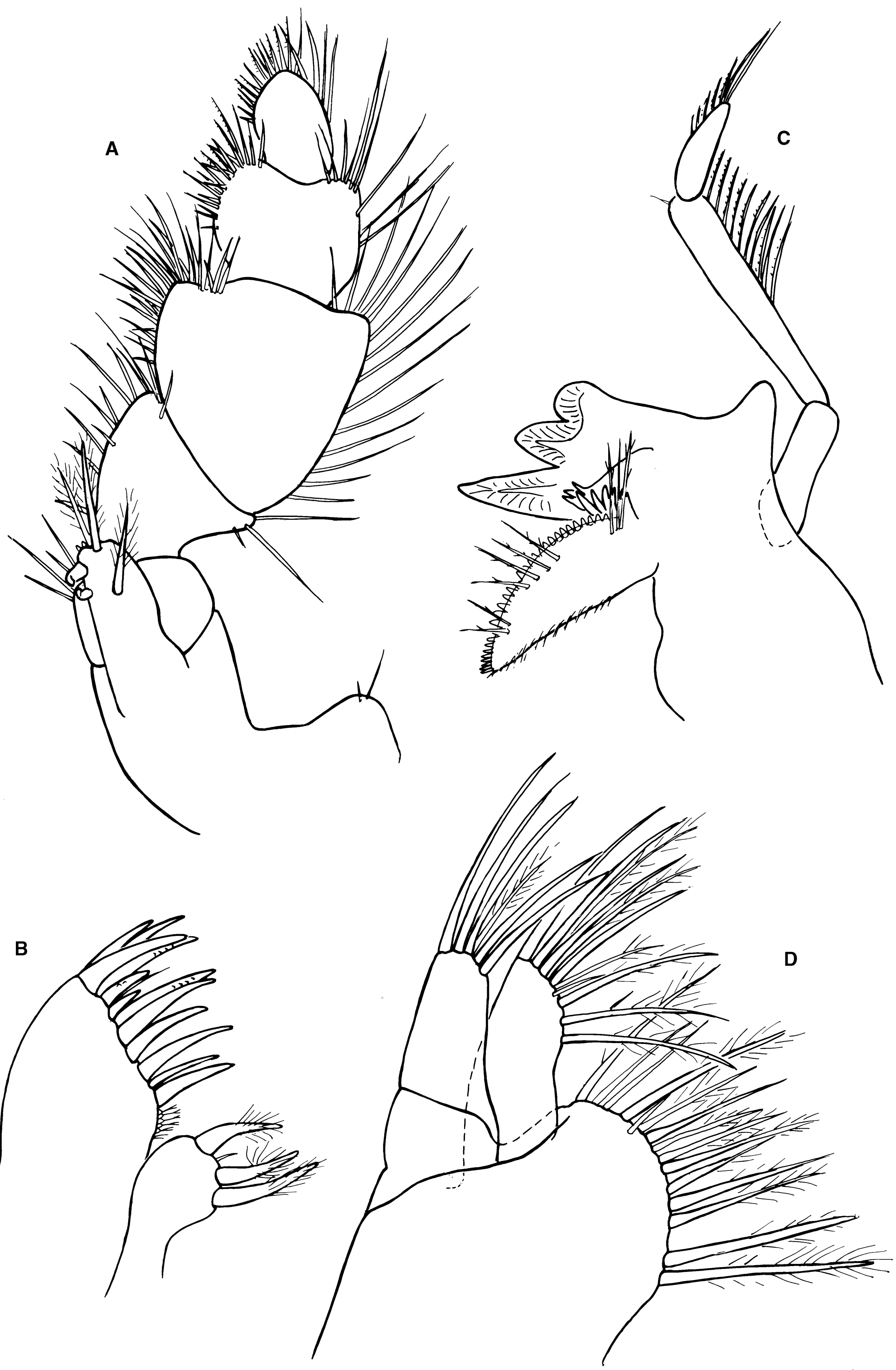

Figure 17. *Politolana haneyi* male holotype: (A) right maxilliped; (B) maxilla; (C) right mandible; (D) maxillule.

Figure 18. *Politolana haneyi* male holotype: (A–C) pereopods 1–3, respectively.

Figure 19. *Politolana haneyi* male holotype: (A–C) pereopods 4–6, respectively.

Figure 20. *Politolana haneyi* male holotype: (A) pereopod 7; (B) right uropod.

Pereon: Body highly vaulted. Medially, pereonites 2, 3 and 7 slightly shorter than 4–6, which are subequal. Pereonite 1 narrowing anteriorly to encompass cephalon, with impression along lateral margin, and less distinct mid-lateral oblique impression. Coxae 2–5 posterior margins subquadrate, not extending beyond posterior margin of respective pereonite; coxae 6 and 7 posterior margins oblique with acute posterior angles, extending well beyond posterior margin of respective pereonite; all coxae without lateral or oblique impressions.

Pleon: Dorso-ventrally vaulted similar to pereon. Pereonite 7 tightly overlapping anterior portion of first pleonite. Epimeres ventrally and posteriorly produced, not laterally flared; epimeres 2–4 bearing sparse lateral setal fringe. Ventral flanges with ventral posterior angles produced into fine points.

Pereopods 1–3: Basis with 6–7 stout circumplumose setae on superior margin. Ischium only moderately produced into scoop-shaped lobe; posterior face of ischium with one submarginal and one oblique row of simple setae. Meral lobe short, just reaching base of propodus, with one (P1) or two (P2 and P3) giant apical setae; inferior margin of merus with long blunt robust setae and adjacent row of short acute robust setae. Ischial and meral lobes of pereopods 1–3 equally produced, but with inferior face of merus broadening into distinct ‘palm’ fringed with robust and simple setae. Carpus of P2 and P3 wider than long. Superior margin of propodus with long row of simple setae. Dactyl length less than propodal length.

Pereopods 4–6: Ischium superior margin with sparse simple setae. Merus and carpus with short blunt robust setae scattered on posterior face of articles, more organized into transverse rows on posterior pereopods; inferior margins of merus and carpus with long and short robust setae. Carpus longer than wide, lengthening posteriorly; P6 with slender distally biserrate setae on superior distal angles of carpus and propodus. Propodus superior margin with sparse setae (P4 and P5).

Pereopod 7: P7 similar to P6 except longer.

Pleopods: Pleopod 1 peduncle subquadrate, with six coupling hooks; endopod width about one-half of exopod width. Peduncle of pleopods 2 and 3 with five plumose coupling hooks. Pleopod 4 with four plumose coupling hooks.

Uropod: Peduncle medial production distally acute, apex with 3 PMS; peduncle ventral distal lateral corner with robust seta in lateral setal row. Endopod distal margin broadly truncate, with PMS and five small robust setae of relatively equal size, without giant apical seta. Exopod shorter than endopod, reaching endopodal notch; peltate shape: flat with convex lateral margins; apex with robust seta and one or two short simple setae; distal medial and lateral margins with small robust setae.

Pleotelson: Posterior margin narrowly rounded, with PMS and four small robust setae.

Variation. Setation on all appendages, including antennae and mouth parts, becomes more dense with size. Frontal margin of the cephalon is more concave medially in larger animals, and the small rostral point is not always as distinct as on the holotype. Ommatidial cuticular facets range from absent to well developed. This species has two frontal lamina morphologies: the long spatulate form of the holotype, visible in dorsal aspect, and a shorter slight hourglass shape, more typical among *Politolana*, which is not visible from dorsal aspect. Antenna peduncle article 5 varies in length from slightly longer than wide to almost twice as long as wide. The antenna flagellum can have from 15 to 22 articles. Maxilliped endites have one or two coupling hooks. The oblique impression on the mid-lateral face of pereonite 1 is sometimes absent. The posterior angles of coxae 6 and 7 can be less acute and less posteriorly projected than in the holotype. Pereonite 7 may completely overlap pleonite 1. Pleopod coupling hook numbers increase with size.

Sexual dimorphism. Males and females are similar. Males with appendix masculina long, tapering evenly to narrow point, extending well beyond distal margins of both pleopod rami.

Size range. Adults range from 10.5 mm to 23 mm in length.

Remarks. Politolana impostor has been mistakenly identified as *Politolana polita* in the past (see remarks section of *P. polita* description). However, the reduced form of the frontal lamina and the very short antennae of *P. polita* immediately distinguish it from this species. *Politolana impostor* is also very similar to *P. concharum* and *P. micropthalma*. In most cases, it can be distinguished from these species by the spatulate frontal lamina. In addition, the form of the uropod rami and the inner production of the uropod peduncle also differ from *P. concharum* and *P. micropthalma*. The subquadrate eyes of *P. impostor* also differ from the triangular eyes of *P. concharum*.

Etymology. Since the late 1800s this species has been figured and described as *P. polita*. Because this species has for so long remained undistinguished from *P. polita*, we have given it the name *impostor*.

Distribution. A west Atlantic lower boreal species, recorded as far north as Aspy Bay, Nova Scotia but more commonly found on the Georges Bank and on the continental shelf south to approximately 38°N. One unusual record, a single specimen collected from the mouth of a fish, exists from Cape Hatteras. Collection depths range from 29 m to about 587 m, but the majority of specimens have been collected between 70 m and

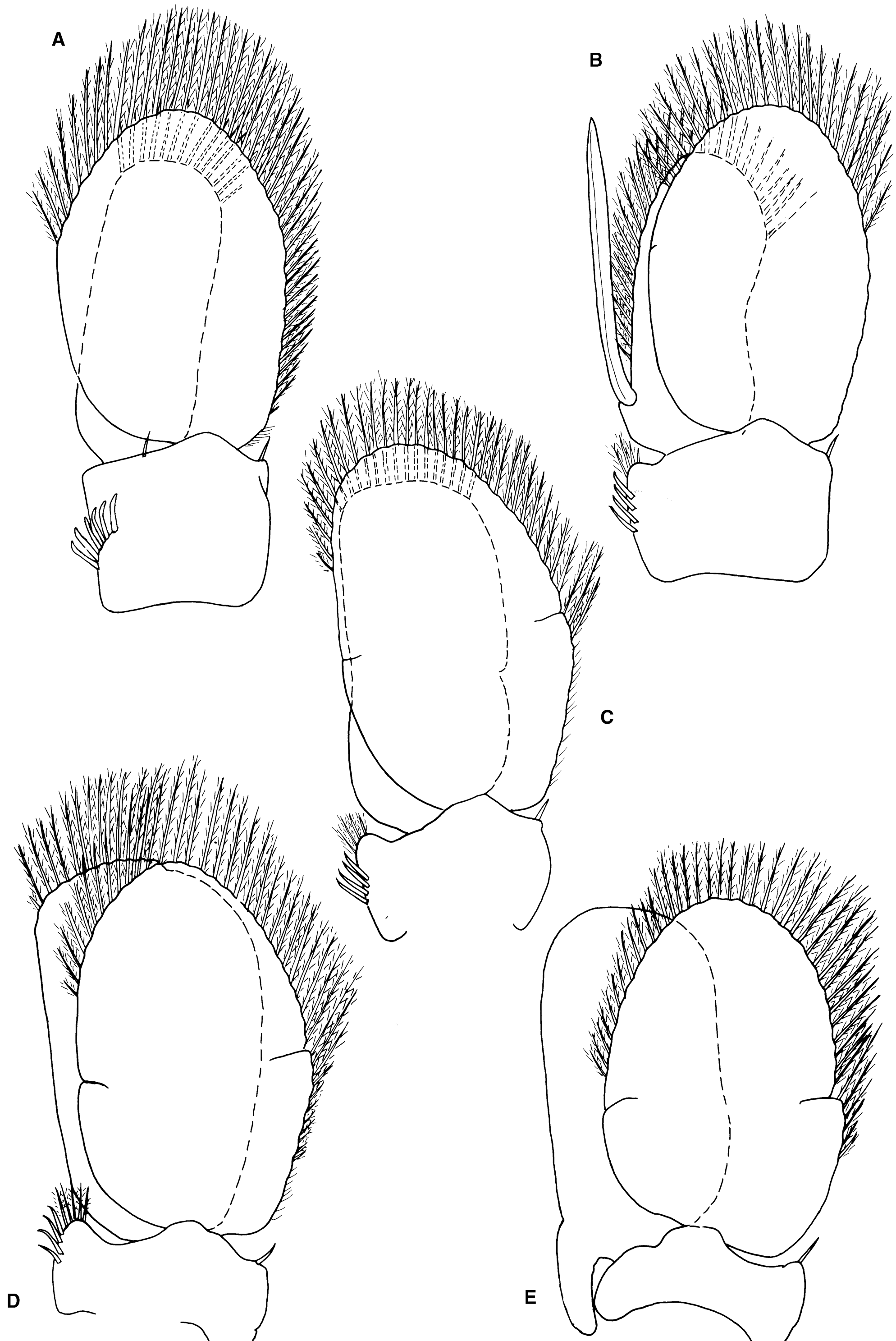

Figure 21. *Politolana haneyi* male holotype: (A–E) pleopods 1–5, respectively.

200 m. *Politolana impostor* has been collected together with *P. impressa*, *P. polita* and *P. concharum*.

*Description of **P. haneyi n.sp.** (Figs 16–21)*
Holotype. Male, 13.5 mm long, USNM #288401
Type locality. Guaymas Basin, Gulf of California.
Paratypes. USNM#288402–2888403: Guaymas Basin, Gulf of California; 20 females, 11 males, 3 mancas.
Additional material examined. Series of specimens from Gulf of Mexico, 29°06 N, 88°28 W, 311 m, 11°C, 2 August 1987— GCRL#1361: 9 males, 7 females, 4 juveniles. GCRL#1366: 50+ spec. USNM#211890: off FL, 26°16.53 N, 84°05.97 W, 146 m, col. by Mml for BLM, trawl sta. 33, 7 July 1981; 1 female. USNM#236181: off Sombrero Light, FL, 92–110 m, col. by Thompson & Mcginty, R/V Triton, 6 June 1950; 2 females.
Diagnosis. Body highly vaulted, pereon and pleon convex and tightly articulated. Coxae 4–6 narrow, with oblique impressions. Cephalon anterior margin medially straight, without rostral point; lateral margins of raised frontal ridge extending over and dividing eyes. Eyes large, round, darkly pigmented. Interocular furrow complete. Antennae reaching middle of second pereonite. Pereopods 1–3 ischium and merus superior distal angles greatly produced, with meral lobe reaching midpoint of propodus; inferior margin of merus with row of long acute robust setae. Merus and carpus of pereopods 4–6 with robust setae arranged in transverse rows on posterior face. Ischium superior margin with sparse simple setae; P5–P7 posterior distal margin of ischium with studded-biserrate setae. Pereopod 7 superior distal angle of merus with long slender plumose setae. Uropod endopod apex narrowly subacute, with distomedial margin slightly concave; apex with cluster of long simple setae. Exopod shorter than endopod peltate in shape, apex with large robust seta, two smaller robust setae and a cluster of long simple setae. Pleotelson posterior margin convex with PMS and four small robust setae.
Description of holotype. Male, 13.5 mm long; body length about 4 × width. Pereon cuticle highly polished; cream colour in alcohol without any apparent chromatophores or pigmentation.
Cephalon: Polished, without strong minute punctation. Anterior margin medially straight without rostral point; lateral margins of raised frontal ridge extending over and dividing eyes. Interocular furrow complete. Eyes large, round, darkly pigmented; cuticular ommatidial facets absent. Frontal lamina narrow, length about 4.5 × greatest width, reaching middle of antennule peduncles, with slight hourglass shape. Frontal lamina and clypeus with lateral margins raised as thickened ridges.
Antennule: Peduncle articles with short simple and palmate setae on distal angles; peduncle article 3× longer than wide. Flagellum composed of 11 articles, each with 4–6 aesthetascs; first flagellar article longest, with length subequal to width; width of subsequent articles about twice length.
Antenna: Reaching middle to end of second pereonite. Peduncle articles 3–5 progressively longer; article 3 length subequal to width, widening distally; article 4 longer than wide, narrowing distally, posterior distal angle bearing four long stiff simple setae and some short palmate setae; article 5 narrow, approximately 3× longer than wide, with width about half the basal width of article 4, posterior distal angle bearing 1–3 long stiff simple setae and several short palmate setae. Flagellum composed of 20 articles, subquadrate proximally, lengthening distally.
Mandible: Molar process dorsal surface covered with fine setae arranged into small shingle-like rows; spines on anterior margin widely spaced, not touching at their bases; submarginal setal row with approximately 13 long lightly plumose setae extending from proximal cluster.
Maxilliped: Endite with distal cluster of three robust circumplumose setae; right and left endites with two coupling hooks.
Pereon: Body highly vaulted. Medially, pereonite 1 longest, 2 shortest, 3–7 subequal in length, with 5 and 6 slightly longer; in dorsal aspect. Pereonite 1 narrows markedly to encompass cephalon; with impression along lateral margin and a small, faint oblique impression on mid-lateral surface, anterolateral margins straight forming blunt anterior angles. Coxae 2 and 3 with impression parallel to lateral margin; coxae 4–6 narrow, posterior margins oblique with acute posterior angles, progressively more extended posteriorly, with distinct oblique impressions; coxae 7 length subequal to coxae 6, without oblique impressions, posterior angle acute.
Pleon: Pereonite 7 overlapping anterior portion of first pleonite. Cuticle less polished than pereon; dorsoventrally vaulted similar to pereon. Epimeres ventrally, but not laterally produced, only 1 and 4 posteriorly produced; epimeres 2–4 bearing dense lateral setal fringe. Ventral flanges with ventral posterior angles rounded.
Pereopods 1–3: Basis superior submarginal setal row with fewer than 10 setae, with 6–7 stout circumplumose setae on superior margin. Ischium posterior face with two oblique rows of stout simple setae; superior distal angle produced into large scoop-shaped lobe. Merus superior distal angle produced into large recurved lobe reaching midpoint of propodus, with one (P1) or two (P2 and P3) apical setae slightly more robust than adjacent setae; inferior margin of merus with row of long acute robust setae and adjacent row

of short acute robust setae. Ischial and meral lobes of P1–P3 progressively less produced. Carpus of P2 and P3 subquadrate. Distal superior margin of propodus with short row of simple setae. Dactyl length less than propodal length.

Pereopods 4–6: Ischium superior margin with sparse simple setae; posterior distal margin with studded-biserrate setae (absent on P4). Posterior face of merus and carpus with robust setae in short transverse rows or clusters extending from inferior margin, progressively less setose posteriorly. Carpus narrow, 2–3× longer than wide, lengthening posteriorly. Pereopod 6 distal angles of merus and carpus with long distally biserrate setae; propodus inferior margin with short acute distally biserrate setae, and with a robust studded-serrate seta on inferior distal angle.

Pereopod 7: Like P6 *except*: slightly shorter; superior distal angle of merus with long slender plumose setae, long slender distally biserrate setae, and short acute robust setae. Carpus distal margin expanded, about 2–3× as wide as proximal propodal width; propodus length subequal to carpus length.

Pleopods: Pleopod 1 peduncle subquadrate, with six plumose coupling hooks; endopod width about one-half of exopod width. Pleopod 2 peduncle with four plumose coupling hooks; appendix masculina narrow, of relatively constant width, tapering evenly to slightly curved apex; reaching or extending slightly beyond exopod apex. Pleopods 3 and 4 with four plumose coupling hooks.

Uropod: Peduncle medial production distally acute, with five long plumose setae. Endopod apex narrowly subacute, with distomedial margin slightly concave; apex with cluster of long simple setae, flanked by two short robust setae; distal margin with three additional smaller robust setae and PMS. Exopod shorter than endopod, flat, with lateral margins slightly convex, apex with large robust seta, two smaller robust setae, and a cluster of long simple setae; distal lateral margin with a small robust seta.

Pleotelson: Posterior margin evenly convex, with PMS and four small robust setae.

Variation. While not present in the holotype, some animals have a distinct distal patch of fine setae on the mandible molar process, as in *P. impressa*. The length of antennule peduncle article 3 ranges from subequal to the width to longer than wide. The antenna has 19–22 flagellar articles. Maxilliped endites have one or two coupling hooks, typically two. The oblique impression on the lateral face of the first pereonite ranges from absent to well developed.

Sexual dimorphism. Males are typically smaller than females, with the largest males only slightly larger than the smallest females.

Remarks. This species is very similar to *P. impressa*; however, it can easily be distinguished by the vaulted or dorso-ventrally convex form of the pleon and the form of the uropod endopod.

Etymology. This species is named for Todd Haney, good friend and fellow crustacean biologist.

Distribution. An amphi-American subtropical species known from the Gulf of California and the northern Gulf of Mexico. *Politolana haneyi* is found in the same locality as *P. impressa* and *P. wickstenae* in the Gulf of Mexico, but in shallower waters between 92 m and 311 m. We know that the Gulf of California sample was collected in the Guaymas Basin, but lack any other collection locality information including the depth of collection. See the biogeography section for a discussion of the amphi-American nature of this species.

Diagnosis of P. tricarinata Riseman *et al. 2001 (Fig. 22)*

Holotype. Male holotype, deposited at Museu de Zoologia da Universidade de São Paulo (MZSP) cat. no. 12820.

Type locality. Ubatuba, northern São Paulo State, Brazil, 23°38′S, 44°49′W, 48 m, 22 January 1986.

Paratypes. Series of specimens from Ubatuba, São Paulo State, Brazil—MZSP#12821: 23°50′S, 45°10′W, 27 October 1985, 38–40 m; 2 males, 9 females, 7 juveniles. MZSP#12822: 23°34′S, 45°06′W, 9 July 1986, 25 m; 1 male, 1 female, 1 juvenile. USNM#288407: 23°39′S, 44°53′W, 20 April 1986, 45–48 m; 2 males, 2 females, 3 juveniles. USNM#288408: Ubatumirim, São Paulo State, Brazil, 23°22.50′S, 44°53′W, May 1993, 15 m; 1 female.

Diagnosis. Body long, cylindrical, length 4.5–5.75× width, with pereonal segments loosely articulated. Adult length to at least 10.5 mm. Pereon loosely articulating with and overlapping pleon. Cephalon with transverse cuticular ridge between frontal ridge and interocular furrow. Antennae extended to middle of first pereonite. Frontal lamina narrow, usually spatulate (expanded anteriorly); visible in dorsal aspect projecting between antennular peduncles. Pereonite 7 longest. Pleotelson posterior margin narrow, slightly subacute; with several plumose marginal setae and 4–6 small robust setae. Pereopods 1–3 with ischium and merus superior distal angles greatly produced, with meral lobe reaching midpoint of propodus; inferior margin of merus and carpus with long acute robust setae. Pereopods 4–7 posterior distal margin of ischium with studded-biserrate setae. Pereopod 7 superior distal angle of merus with long slender plumose setae. Pleopod 2 appendix masculina broad and straight, of relatively constant width until apex where it narrows to a point. Uropod with cluster of very long simple setae at apices of both endopod and exopod; endopod distal margin broad and truncate; exopod shorter than or just reaching endopod notch.

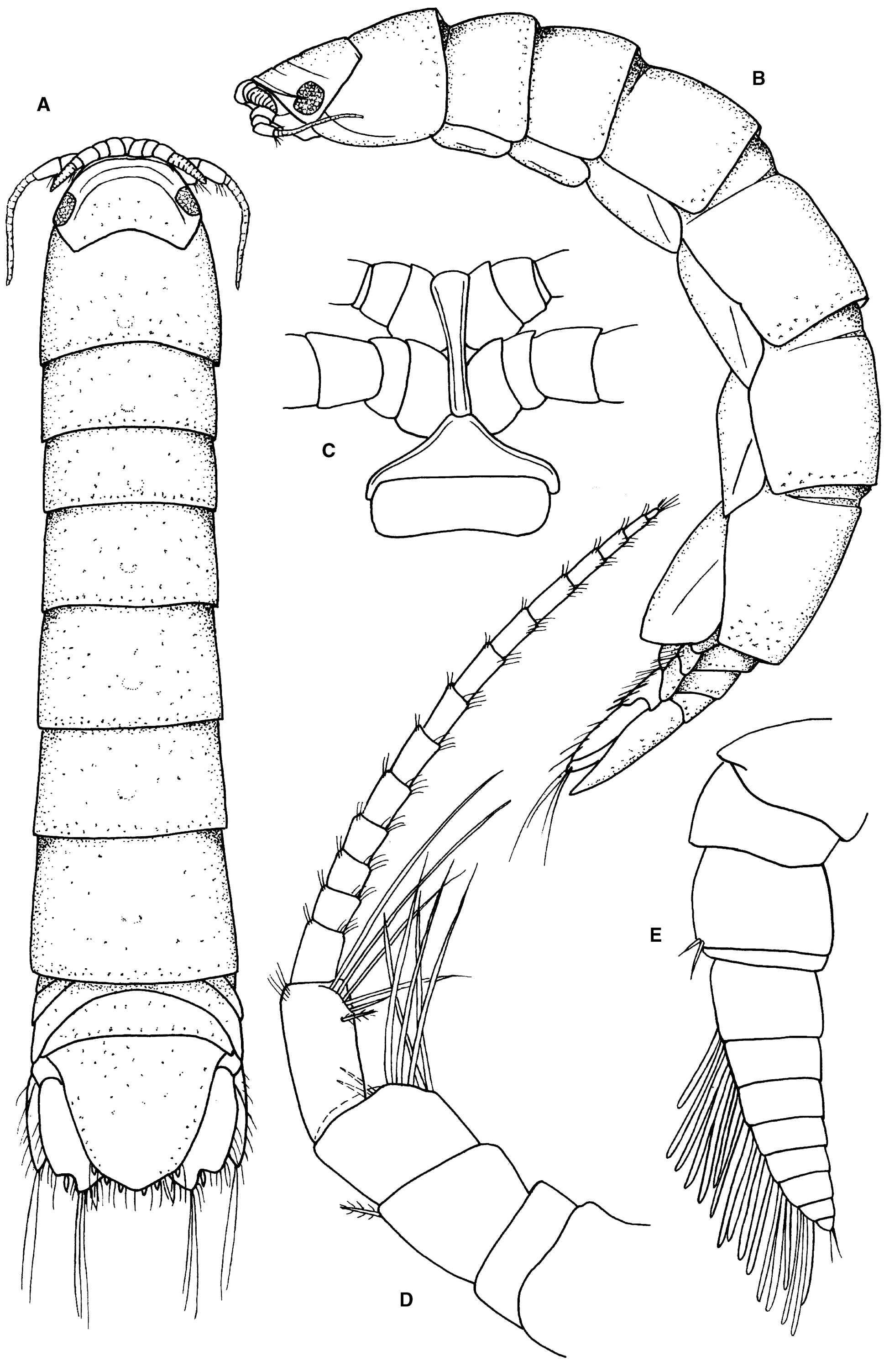

Figure 22. *Politolana tricarinata* female: (A) dorsal aspect. *Politolana tricarinata* male holotype: (B) lateral aspect; (C) frontal lamina; (D) antennae 2; (E) antennae 1.

Distribution. Politolana tricarinata is known from the type locality and from the São Sebastião coast, south of Ubatuba, Brazil. Specimens were collected only on the inner shelf, from 15 m to 48 m depth, on sandy bottoms where medium and fine grains predominate, in water temperatures of 16°C–22°C. Politolana eximia is also found within the warm-temperate waters of the Brazilian coast but at depths greater than 50 m.

Redescription of P. polita (Stimpson, 1853)
(Figs 23–27)

Synonymy. Aega polita: Stimpson (1853): 41–42; Lütken, 1859: 77 (not seen); Verrill (1873): 16. *Conilera polita:* Harger (1874) (not seen): 3, 22; Verrill (1874a): 411. *Cirolana polita:* Harger (1879): 161 1880: 381–382; Richardson (1900): key, 217 1901: 511 1905: 99–101; Schultz (1969): 182; Verrill (1885): 559; Watling et al. (1974): 347–349. *Politolana polita:* Bruce (1981a): 959. Not *Politolana polita* (Stimpson 1853): Harger (1883): pl. 1, Figs 1, 1(c), pl. 2, Figs 2, 2(b); Richardson (1905): Figs 80, 81; Menzies & Frankenberg (1966): 18, 50–51, Fig. 26; Schultz (1969): Fig. 285; Kussakin (1979): 205–206, Figs 83, 84; Kensley & Schotte (1989): 140–143, Figs 63, 64.

Type material. Nongravid female neotype, 14 mm long, herein designated. Col. by M.J. Rathbun, 8 August 1898, USNM#25150.

Original type locality. High Duck Island, New Brunswick, low water mark.

Neotype locality. Off Long Beach, Grand Manan, New Brunswick, 1.83 m.

Additional material examined. MCZ#8433: Ipswich, MA; 5 females, 3 males. MCZ#6944: locality unknown; 10 females, 4 gravid females, 5 males. MCZ#8435: Woods Hole, MA, collected on the beach; 1 female. USNM#25150: off Long Beach, Grand Manan, Canada, 1.8 m, col. by M.J. Rathbun, 8 August 1898; 1 female. USNM#35485: off Cape Cod, MA, 12.8 m, col. by USFC, R/V Speedwell, sta. 354 1879; 2 females (also examined by Harger). USNM#41870: Barrington Pass, Nova Scotia, 9.2 m, col. by Geol Sur. of Canada, 1 July 1910; 2 males, 1 gravid female. USNM#191808: off NJ, 38°48.30 N, 73°36.36 W, 57 m, col. by VIMS, MMS/NEBP, sta. Ef1, 10 November 1976; 1 damaged female.

Series of specimens from off NJ, col. by VIMS, MMS/NEBP—USNM#191877: 39°07.06 N, 73°49.36 W, 32.5 m, sta. D2, 17 August 1976; 1 gravid female, 10 mancas/juveniles. USNM#191879: 39°06.36 N, 72°59.00 W, 77 m, sta. I1, 23 August 1976; 1 damaged spec. USNM#191880: 39°04.36 N, 73°51.12 W, 31 m, sta. D1, 16 June 1976; 2 mancas. USNM#191881: 39°02.54 N, 73°47.06 W, 51 m, sta. D4, 17 June 1976; 1 manca. USNM#191883: 39°06.36 N, 73°45.54 W, 36 m, sta. D3, 17 June 1976; 3 females, 1 male, 1 damaged. USNM#191884: 39°06 36 N, 73°45.54 W, 36 m, sta. D3, 17 June 1976; 1 male. USNM#191885: 39°06.36 N, 73°45.54 W, 36 m, sta. D3, 17 June 1976; 1 spec. USNM#191886: 38°41.24 N, 73°32.24 W, 56 m, sta. E3, 18 June 1976; 1 spec. USNM#191887: 38°44.06 N, 73°25.00 W, 73 m, sta. E2, 18 June 1976; 1 spec.

Series of specimens from Georges Bank, col. by MMS/NEBP—USNM#214240: 40°52.59 N, 68°00.00 W, 52 m, sta. 12, 8 May 1977; 1 gravid female, many mancas. USNM#214241: 40°49.20 N, 68°11.13 W, 57 m, sta. 9, 8 May 1977; 1 male (+1 P. concharum male). USNM#214242: Nantucket Shoals of Georges Bank, 41°07.54 N, 70°33.15 W, 40 m, sta. 1, 21 May 1977; 2 gravid females.

Series of specimens from outer Sheepscot Bay, ME, col. by L. Watling—USNM#288420: 43°43.4′N, 69°43.6′W, 29 m, sta. B3, 9 August 1988; 1 female, 1 manca. Research Collection of L. Watling (University of Maine): 43°43.4′N, 69°43.6′W, 29 m, sta. B3, 13 June 1988; 1 male, 1 female (+1 P. impostor). Research Collection of L. Watling (University of Maine): 43°33.3′N, 69°43.5′W, 31.5 m, sta. B5, 27 June 1988; 1 female.

Diagnosis. Cephalon anterior margin convex, indented at bases of antennules with small medial point; interocular furrow complete. Lateral margins of frontal ridge reaching but not dividing eyes. Eyes large, subquadrate, darkly pigmented; with rows of short simple setae fringing eyes ventrally. Frontal lamina greatly reduced to small ridge sitting deep between antennae. Antennae very short, just reaching beyond posterior margin of cephalon; with dense setation on peduncle articles 4 and 5. Coxae without lateral or oblique impressions; coxa 7 narrow with acute posterior angle. Pereopods 1–3 robust and highly setose, with superior distal angle of ischium and merus only moderately produced; merus and carpus with very numerous short blunt robust setae scattered on posterior face of articles; inferior margin of merus with row of short, distally blunt robust setae. Pereopods 5 and 6 with short studded-serrate robust setae on merus and carpus anterior distal margins. Uropod endopod apex subacute with large apical robust seta; exopod shorter than endopod, reaching beyond endopodal notch, narrow and curved medially, apex with large robust seta. Pleotelson narrowly convex or subtriangular, without robust setae.

Description of male (MCZ#8433). Eighteen millimetres long, body narrow with length about 4 × width. Pereon cuticle highly polished; cream colour in alcohol, with remnants of numerous pigmented chromatophores on pleotelson and concentrated on posterior region of pereonal and pleonal segments.

Cephalon: Polished, without strong minute punctation. Anterior margin convex, indented at bases of antennules with small medial point. Lateral margins of raised frontal ridge reaching, but not dividing eyes. Interocular furrow complete. Eyes large, subquadrate, darkly pigmented; with rows of short simple setae fringing eyes ventrally (Fig. 23F). Frontal lamina greatly reduced to small ridge deep between antennae, broadening anteriorly; not extending far between peduncles of first antennae. Clypeus without distinctly raised lateral margins.

Antennule: Peduncle cuticle with microscopic ovate macula; peduncle article 2 posterior distal angle with 2–3 short circumplumose setae. Flagellum composed of 13 articles, each with 2–9 short aesthetascs; first flagellar article longest, wider than long; width of subsequent articles about 3 × length.

Antenna: Only slightly longer than first antenna, just reaching beyond posterior margin of cephalon. Peduncle articles 3–5 subequal in length; article 3 length subequal to width, article 4 wider than long, widening slightly distally, posterior margin and distal angle bearing dense cluster of more than 20 long stiff simple setae and some short circumplumose setae; article 5 slightly longer than wide, with width about 2/3 width of article 4, posterior distal angle bearing more than 15 long stiff simple setae. Flagellum composed of nine subquadrate articles.

Mandible: Molar process surface with fine setae organized into small shingle like rows; anterior margin with spines widely spaced, not touching at their bases; submarginal setal row with long lightly plumose setae extending from proximal cluster.

Maxilliped: Endite with approximately 6–8 robust circumplumose setae; right endite with two coupling hooks, left endite with three coupling hooks. Palp articles 1 and 2 with submarginal cluster of simple setae on distomedial angle.

Pereon: Medially, pereonite 2 shortest, 3 and 4 subequal in length, 5 and 6 longest, 7 slightly shorter than pereonite 6; pereonite 1 with impression along lateral margin and small faint oblique impression on mid-lateral surface; anterolateral margins straight forming a rounded angle. All coxae without lateral or oblique impressions; coxae 2–4 posteriorly rounded; coxae 5 and 6 posterior margins oblique and slightly sinuate, progressively more extended posteriorly; length of coxae 7 subequal to coxae 6 length, with very acute posterior angle, extended to pleonite 4.

Pleon: Pereonite 7 overlapping most of first pleonite. Dorso-ventrally vaulted similar to pereon. Epimeres ventrally produced, but not laterally flared, posteriorly produced; epimeres 2–4 bearing sparse lateral setal fringe. Ventral flanges partially obscured by dorsal epimeres, ventral posterior angles rounded.

Pereopods 1–3: Basis superior submarginal setal row dense, with more than 15 setae. Ischium only moderately produced into scoop-shaped lobe. Meral lobe short, just reaching base of propodus, with one (P1 and P2) or two (P3) giant apical setae; inferior margin of merus with row of distally blunt, flattened and textured setae and row of adjacent short acute robust setae. Ischial and meral lobes of P1–P3 equally produced, but with inferior face of merus broadening into distinct ‘palm’ fringed with robust and simple setae. Carpus of P2 and P3 wider than long. Superior margin of propodus with long row of simple setae. Dactyl length less than propodal length.

Pereopods 4–6: Ischium superior margin without simple setae. Merus and carpus with numerous short blunt robust setae scattered on posterior face of articles, remaining dense through P6; inferior margins with long and short blunt robust setae; anterior distal margins with medial row of 4–5 short studded-serrate robust setae (P5 and P6); P4 carpus length subequal to width, longer than wide on P5 and P6. Propodus without simple setae on superior margin.

Pereopod 7: P7 similar to P6 except: slightly longer, with slender distally biserrate setae on superior distal angles of merus, carpus and propodus; posterior face of merus and carpus less setose and with setae more organized into rows.

Pleopods: Pleopod 1 peduncle subquadrate, with six plumose coupling hooks; endopod width about one-half of exopod width. Pleopod 2 peduncle with five plumose coupling hooks; appendix masculina narrow, of relatively constant width, tapering evenly to slightly curved apex, extending slightly beyond distal margins of exopod; exopod distal margin broadly rounded. Pleopods 3 and 4 with four plumose coupling hooks.

Uropod: Peduncle medial production distally blunt or truncate, with 13 long plumose setae confined to apex. Endopod apex triangular or subacute, with large apical robust seta; distal margin with two smaller robust setae and PMS; medial notch shallow, without palmate setae set in notch or robust seta lateral to notch. Exopod shorter than endopod, reaching beyond endopodal notch, narrow and rounded, curved medially, apex with large robust seta, medial and lateral margins without additional robust setae.

Pleotelson: Posterior margin narrowly and evenly convex, minutely scalloped, with fine plumose setae, without robust setae.

Variation. The pleotelson apex varies from narrowly rounded to more subtriangular (Fig. 23H).

Sexual dimorphism. Males and females similar.

Size range. Adults 9–18.5 mm.

Remarks. Stimpson’s original description of this species was brief and lacked figures. Because of the inadequate description, and the subsequent loss of the type material, there has been much confusion over the past 145 years regarding this species. This confusion stems partly from the fact that there are at least four very similar species in the vicinity of the type locality:

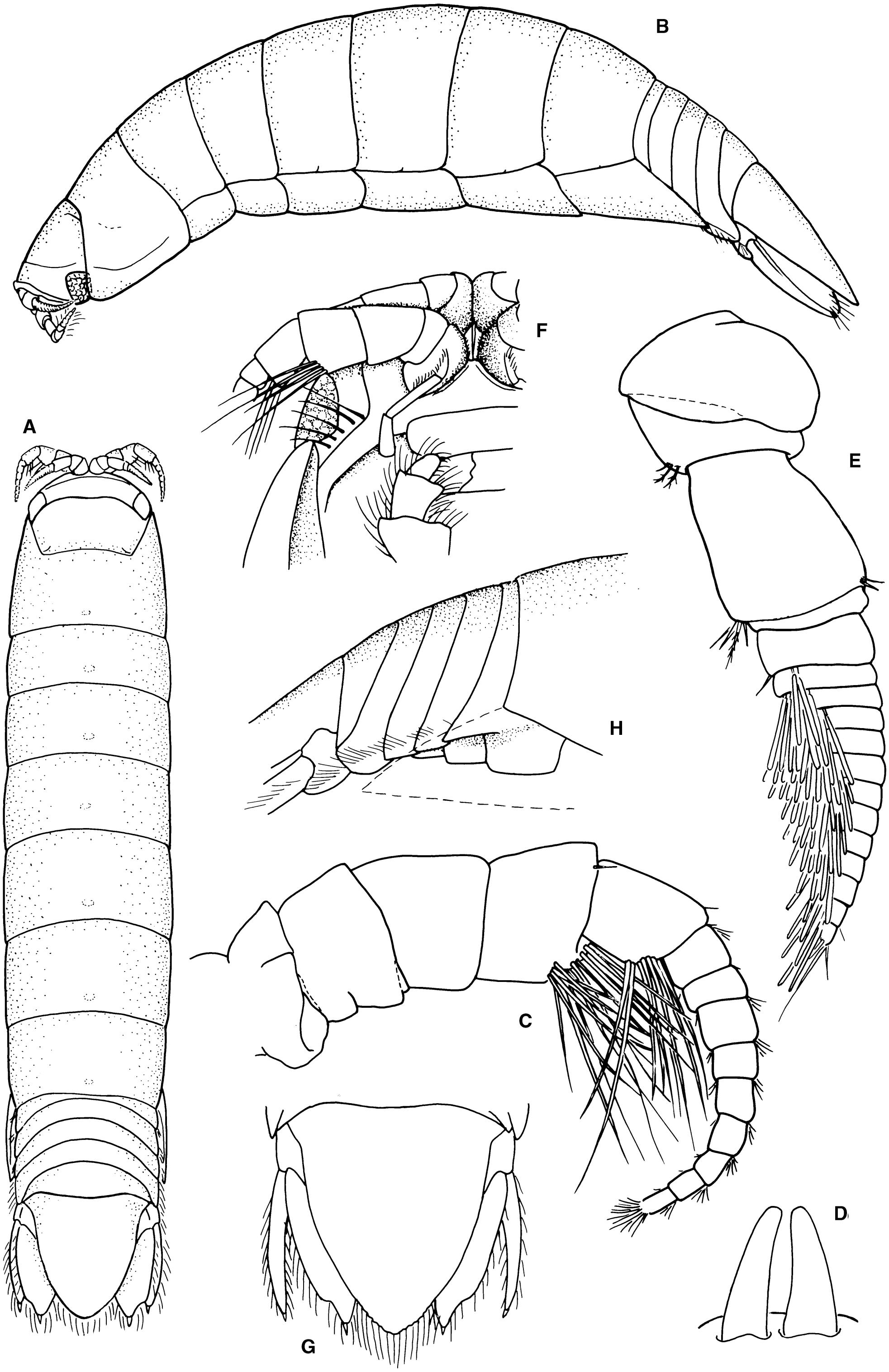

Figure 23. *Politolana polita* male (MCZ#8433): (A) dorsal aspect; (B) lateral aspect; (C) antenna; (D) penes; (E) antennule. *Politolana polita* female neotype: (F) cephalon, ventral aspect; (G) pleon detail. *Politolana polita* female (MCZ#6944): (H) pleotelson.

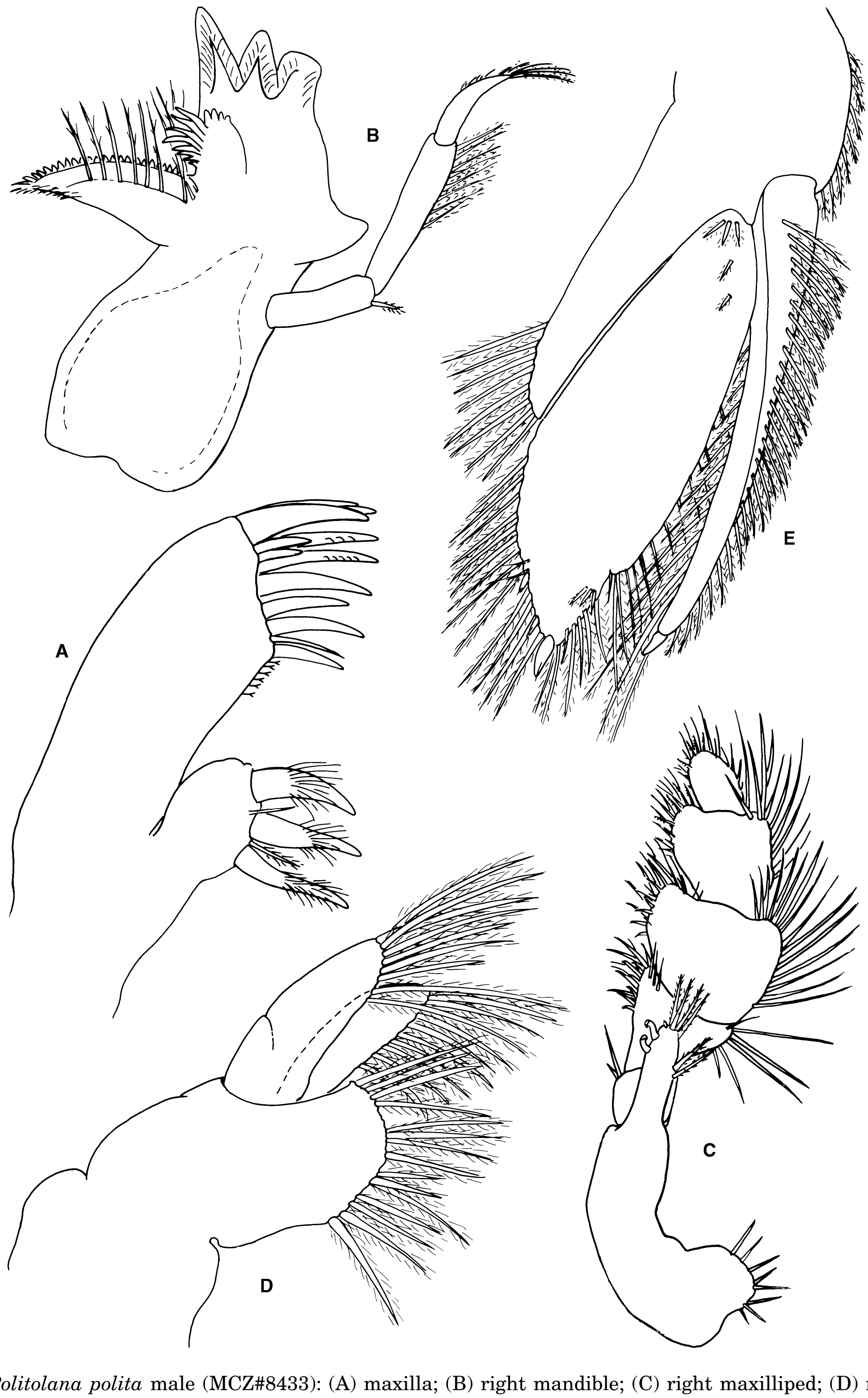

Figure 24. *Politolana polita* male (MCZ#8433): (A) maxilla; (B) right mandible; (C) right maxilliped; (D) maxillule; (E) right uropod.

Figure 25. *Politolana polita* male (MCZ#8433): (A–D) pereopods 1–4, respectively.

Figure 26. *Politolana polita* male (MCZ#8433): (A–C) pereopods 5–7, respectively.

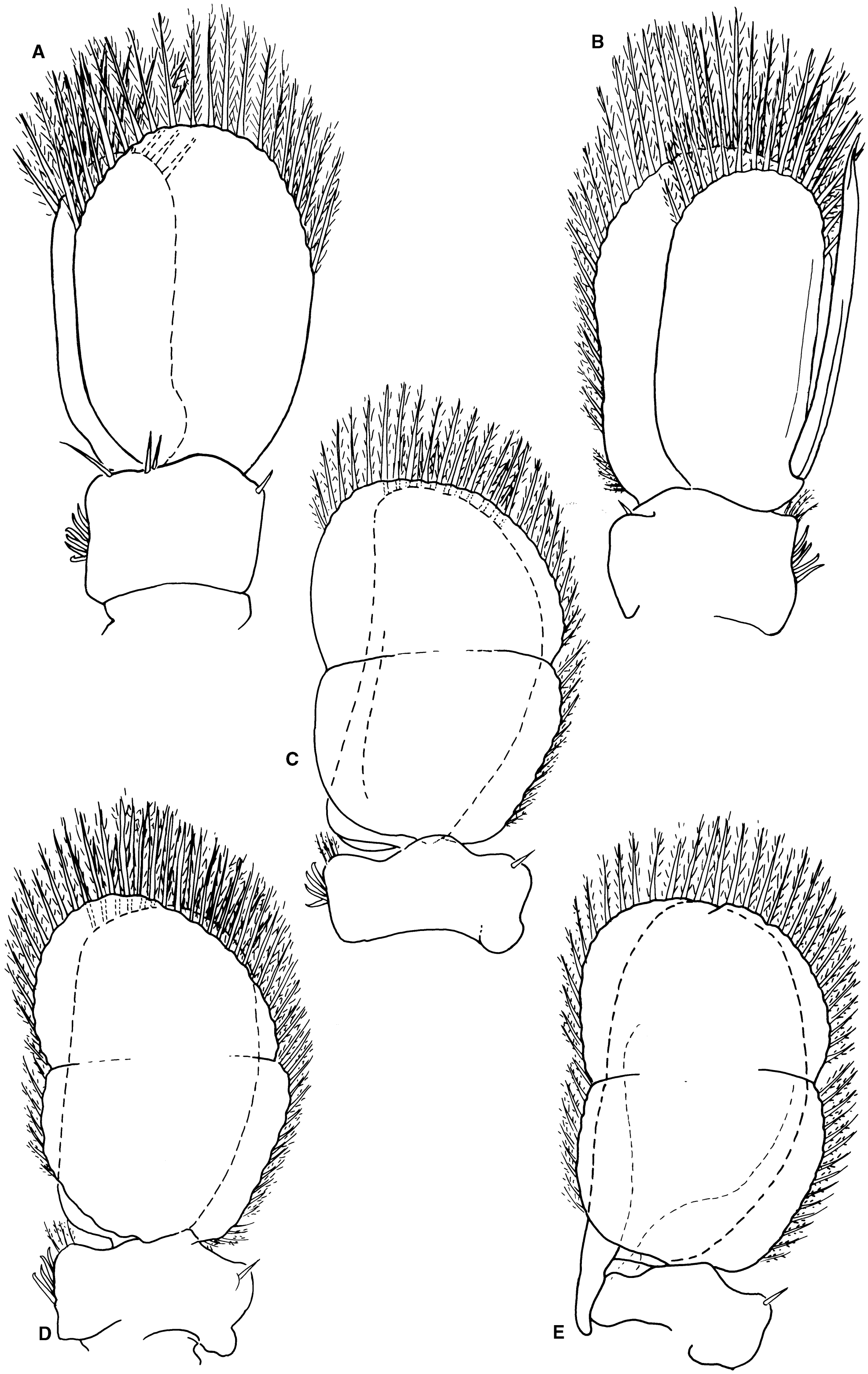

Figure 27. *Politolana polita* male (MCZ#8433): (A–E) pleopods 1–5, respectively.

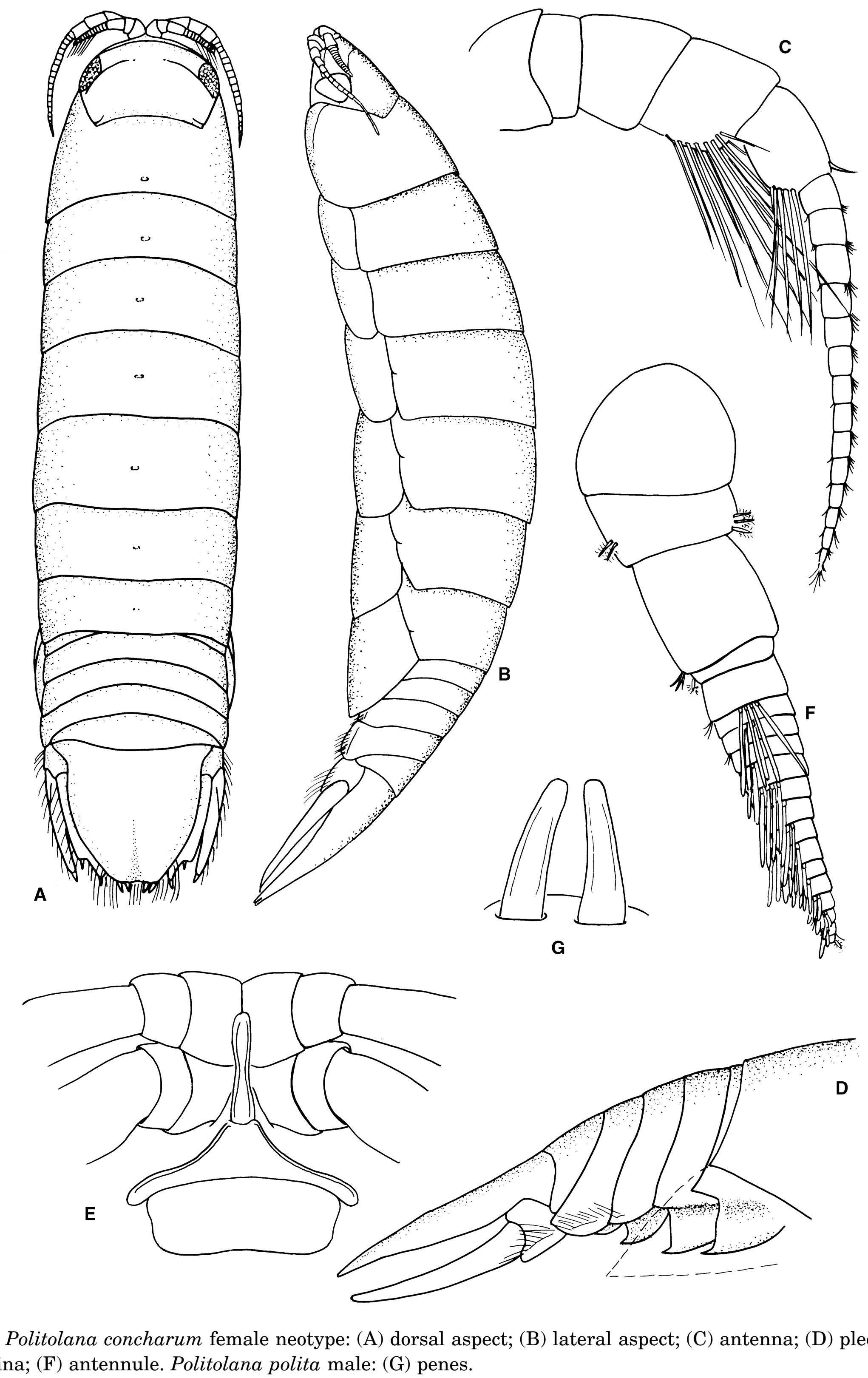

Figure 28. *Politolana concharum* female neotype: (A) dorsal aspect; (B) lateral aspect; (C) antenna; (D) pleon detail; (E) frontal lamina; (F) antennule. *Politolana polita* male: (G) penes.

P. polita, *P. impressa*, *P. concharum* and *P. impostor n.sp.* Most commonly *P. impostor* has been identified, figured and described as *P. polita*, or descriptions of *P. polita* have erroneously combined unique characters of several species into a single species description.

In his 1883 paper, Harger figured *P. impostor as P. polita*. In 1901, Richardson provided a key including *P. polita* and among the characters she used to identify this species were an elongate frontal lamina (characteristic of *P. impostor*) and short antennae (characteristic of *P. polita*). In her 1905 monograph, Richardson again failed to discriminate these two species and described them as one. In the key (p. 83), she used an 'elongate frontal lamina' to distinguish *P. polita*, yet in her description of the same species she described the frontal lamina as 'small and almost inconspicuous'. She also described the antennal flagellum as being short, composed of 10 articles, yet the figure (taken from Harger, 1883) shows an antenna with a flagellum of about 22 articles. Harger (1883: 382) provided a table of the '*P. polita*' material examined and among these the following two lots are actually *P. impressa*: George's Bank, 150 fms (USNM#35930), and East Quereau, 190 fms (USNM#35321). Menzies & Frankenberg (1966), Schultz (1969) and Kussakin (1979) all figured *P. impostor* specimens as *P. polita*.

While Stimpson's description was quite brief, it contains clues as to which of the two forms he was describing, notably his description of the antennae: 'Antennae small but rather stout at base, placed transversely, curving backward, the superior ones being three-fifths as long as the inferior ones, which reach the middle of the first thoracic segment at its lower edge.' The form we have identified as *P. polita* has the short antennae Stimpson noted and this character is unique among the west Atlantic *Politolana* species. On the other hand, the length of the antennae in *P. impostor* is markedly longer, reaching the second pereonite. Given this clear difference, we can confidently identify the species that Stimpson described in 1853. Stimpson stated that the animals were deposited at USNM, and 'in the cabinet of Professor Agassiz, at Cambridge'. We have searched these and other possible collections, and again have not been able to locate Stimpson's type specimens. Because of the past confusion regarding this species, and for nomenclatural stability, it is necessary to erect a neotype in accordance with article 75 of the International Code for Zoological Nomenclature (1999). Of the available material, we have chosen the lot that was collected closest to the original type locality to provide a neotype. This monograph provides the first figures of *P. polita*, 145 years after its description.

Distribution. Politolana polita is a western Atlantic, cold temperate species known from Nova Scotia, Georges Bank, around Cape Cod, Massachusetts, and south to about 38°N. It has been taken at depths of 0–86 m, with the majority of animals collected between 30 m and 60 m. Harger (1880) suggested that this species replaces *P. concharum* to the north. However, the ranges of these two species overlap significantly and *P. polita* has been collected together with *P. concharum*, as well as *P. impostor*, on the Georges Bank and in the Gulf of Maine.

Redscription of P. concharum (Stimpson, 1853) (Figs 28–33)

Synonymy. Aega concharum: Stimpson (1853): 42. *Conilera concharum:* Harger (1874): 572 (278) (not seen); Verrill (1874b): 459 (165) (not seen). *Cirolana concharum:* Harger (1879): 161 1880: 378–381, pls. IX–X, Figs 58–63 1883: pl. 1, Fig. 4, pl. 2, Figs 4, 4(c); Hansen (1890): 333–336, Table 2, Figs 4, 4(f); Richardson (1900): 216 1901, 513 1905: 83, 95, Fig. 75; Schultz (1969): 181–182, Figs 282, 283; Watling et al. (1974): 347–348; Jones (1979): 318; Kussakin (1979): 206–211, Figs 85–87. *Politolana concharum:* Bruce (1981a): 959, Figs 1(j)–(k), 2(g)–(h), 3(g)–(h), 4(d) and 5(g)–(h); Rachlin & Warkentine (1997): 368–379.

Type material. Nongravid female neotype, herein designated, 19 mm long, MCZ#6797a.

Original type locality. Charleston Harbor, SC.

Neotype locality. Charleston, SC.

Additional material examined. MCZ#8436: Woods Hole, MA; 2 females. MCZ#8437: Vineyard Sound, MA; 4 females. MCZ#8439: off Block Island, RI; 5 females. MCZ#6797: Charleston, SC; 16 females, 3 males. MCZ#8431: Albatross IV cruise 72–3, sta. 52; 7 females, 1 male, 1 manca. NMB#6708: 3 specimens. USNM#2971: off New Shoreham, Block Island, RI, 27 m, col. by USFC, 19 August 1874; 1 female. USNM#2970: Eel Pond, Woods Hole, MA, col. by USFC, 23 July 1875; 4 females, 1 male. USNM#6352: Halifax, Nova Scotia, 95 m, col. by Stimpson, USFC, 1877; 1 female. USNM#35315: off Montauk Point, Long Island, from surface, col. by USFC, R/V Albatross, 7 August 1883; 1 male. USNM#35316: off Fishers Island, Long Island Sound, in lobster pots, col. by J.H. Latham, USFC, May 1875; 1 male, about 19 females. USNM#43204: Monroe County, so. of Key West, FL, on edge of Pourtoles Plateau, 24°34 N, 81°48 W, 183 m, col. by J.B. Henderson; 1, female. USNM#106186: Cape May County, Wildwood, NJ, from mammary slits of finback whale, col. by F.A. Ulmer, 6 March 1955; 2 females; 1 male. USNM#191792: off NJ, 39°53.24 N, 72°43.06 W, 55–56 m, col. by VIMS/CABP, sta. G4, 27 August 1976; 2 males, 2 juveniles, 6 females (+2 P. polita). USNM#211103: South-east Brown's Bank, Nova Scotia, in lobster trap, col. by D.S. Pezzack, 21 July

1983; 2 males. USNM#253289: Woods Hole, MA; 1, female (+1 *P. impostor*).

Series of specimens from MA, col. by V.N. Edwards, USFC—USNM#2968: Vineyard Sound, May 1874; 3 females, 1 male. USNM#2969: Vineyard Sound, from stomach of Peak Nosed Skate, 14 May 1874, 2 spec. USNM#3871: Woods Hole, 1881; 20+ spec. USNM#38224: Woods Hole; 26 females, 4 males.

Series of specimens from outer Sheepscot Bay, ME, col. by L. Watling—USNM#288411: 43°43.0′N, 69°43.3′W, 37 m, sta. B1, 30 March 1988; 2 females, 2 males. USNM#288412: 43°43.0′N, 69°43.3′W, 37 m, sta. B1, 28 April 1988; 1 male. USNM#288413: 43°43.0′N, 69°43.3′W, 37 m, sta. B1, 7 June 89; 1 female, 2 mancas. USNM#288414: 43°33.3′N, 69°43.5′W, 31.5 m, sta. B5, 3 March 88; 1 gravid female, 1 male. USNM#288415: 43°43.2′N, 69°43.4′W, 39 m, sta. B7, 28 February 1988; 2 females. USNM#288416: 43°43.2′N, 69°43.4′W, 38 m, sta. B7, 10 January 1989; 1 gravid female, 1 female, 3 mancas, 1 male. USNM#288417: 43°43.2′N, 69°43.4′W, 38 m, sta. B7, 7 June 1989; 1 female. USNM#288418: 43°42.8′N, 69°43.7′W, 37 m, sta. B9, 9 August 88; 1 female. Research Collection of L. Watling (University of Maine): 43°42.8′N, 69°43.7′W, 37 m, sta. B9, 10 January 1989; 1 male, 3 females, 3 mancas.

Diagnosis. Body narrow, with pereon and pleon convex and tightly articulated, pereonite 7 overlapping most of first pleonite. All coxae without lateral or oblique impressions. Pleon ventral flanges with ventral posterior angles produced into fine points. Cephalon anterior margin convex, with small medial rostral point; lateral margins of frontal ridge reaching but not dividing eyes. Eyes large, triangular, darkly pigmented. Antennae short, reaching middle of first pereonite. Pereopods 1–3 with ischium and merus only moderately produced; inferior margin of merus with row of short molariform setae or distally blunt, textured setae. Pereopods 4–6 ischium superior margin with dense simple setae. Pereopod 4 merus and carpus with numerous scattered short robust on posterior face; propodus with sparse simple setae on superior margin. Uropod peduncle ventral distal lateral corner with robust seta in lateral setal row; endopod apex triangular, with large apical robust seta; exopod shorter than endopod, but reaching beyond endopodal notch, narrow and rounded, curved medially, apex with single large robust seta. Pleotelson posterior margin convex with posterior emargination flanked by two large robust setae on each side.

Description of neotype. Female, 19 mm long; body length about 4.5 × width. Pereon cuticle highly polished; cream colour in alcohol; with numerous darkly pigmented chromatophores, concentrated in posterior region of pereonal and pleonal segments, and covering pleotelson.

Cephalon: Cuticle polished, without strong minute punctation. Anterior margin convex, with small medial rostral point; lateral margins of raised frontal ridge reaching, but not extending over and dividing eyes. Interocular furrow incomplete medially. Eyes large, subtriangular, wider dorsally than ventrally, darkly pigmented; cuticular ommatidial facets distinct. Frontal lamina narrow, length about 5 × greatest width, with slight hourglass shape, reaching middle of antennule peduncles. Frontal lamina and clypeus with lateral margins raised into thickened ridges.

Antennule: Peduncle cuticle with microscopic ovate macula; article 2 posterior distal angle with 4–5 short palmate setae. Flagellum composed of 15 articles, each with about 6–7 short aesthetascs; first flagellar article longest, wider than long, width of subsequent flagellar articles about 3× length.

Antenna: Reaching middle of first pereonite. Peduncle articles 3–5 subequal in length; article 3 length subequal to width, widening slightly distally; article 4 subquadrate, posterior distal angle bearing about 20 long stiff simple setae; article 5 only slightly longer than wide, with width about 2/3 width of article 4, posterior distal angle bearing five long stiff simple setae. Flagellum short, length subequal to peduncle length; composed of about 15 subquadrate articles.

Mandible: Molar process dorsal surface with fine setae, posterior surface with scattered larger setae (Fig. 29E); anterior margin with spines widely spaced, not touching at their bases; submarginal setal row with long lightly plumose setae extending from proximal cluster.

Maxilliped: Proximolateral angle of basis bearing cluster of about 10 short simple setae. Endite with distal cluster of approximately 6–8 robust circumplumose setae; right and left endites with two coupling hooks.

Pereon: Medially, pereonite 1 slightly longer than 2 and 3, pereonites 4 and 5 longest, pereonite 7 shorter than 6. In dorsal aspect, pereonite 1 narrowing only slightly anteriorly to encompass cephalon; first pereonite with faint impression along lateral margin; anterolateral margins straight, forming rounded anterior angles. All coxae without lateral or oblique impressions; coxae 2–4 posteriorly rounded; coxae 5 posterior margins subquadrate, forming slight posterior point; posterior margin of coxae 6 suboblique, forming acute posterior angle; length of coxae 7 subequal to 6 with acute posterior angle, extended to pleonite 3 or 4.

Pleon: Pereonite 7 overlapping most of first pleonite; dorso-ventrally vaulted similar to pereon. Epimeres ventrally and posteriorly produced, but not laterally flared; epimeres 2–4 bearing sparse lateral setal fringe. Ventral flanges with ventral posterior angles produced into fine points.

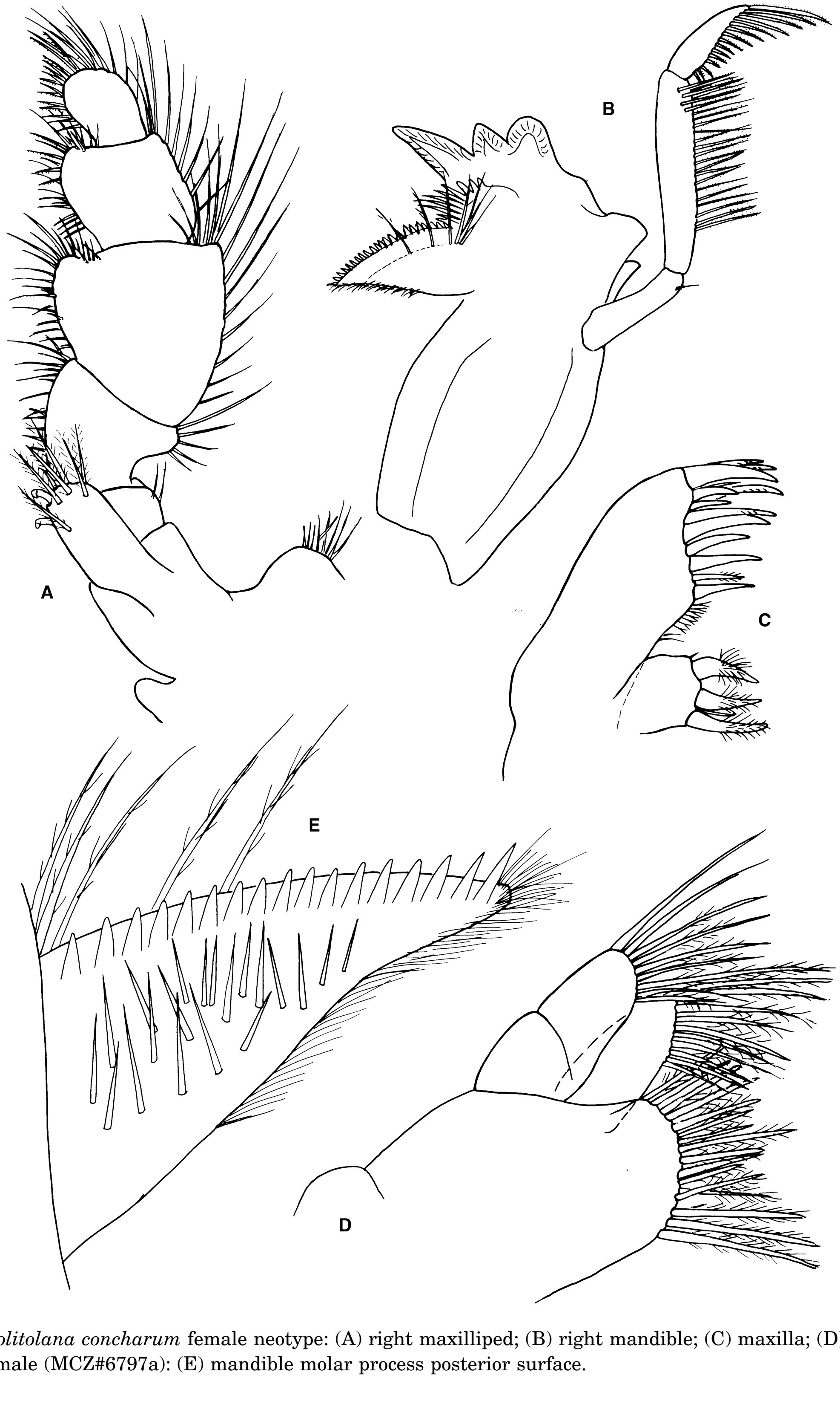

Figure 29. *Politolana concharum* female neotype: (A) right maxilliped; (B) right mandible; (C) maxilla; (D) maxillule; *P. concharum* female (MCZ#6797a): (E) mandible molar process posterior surface.

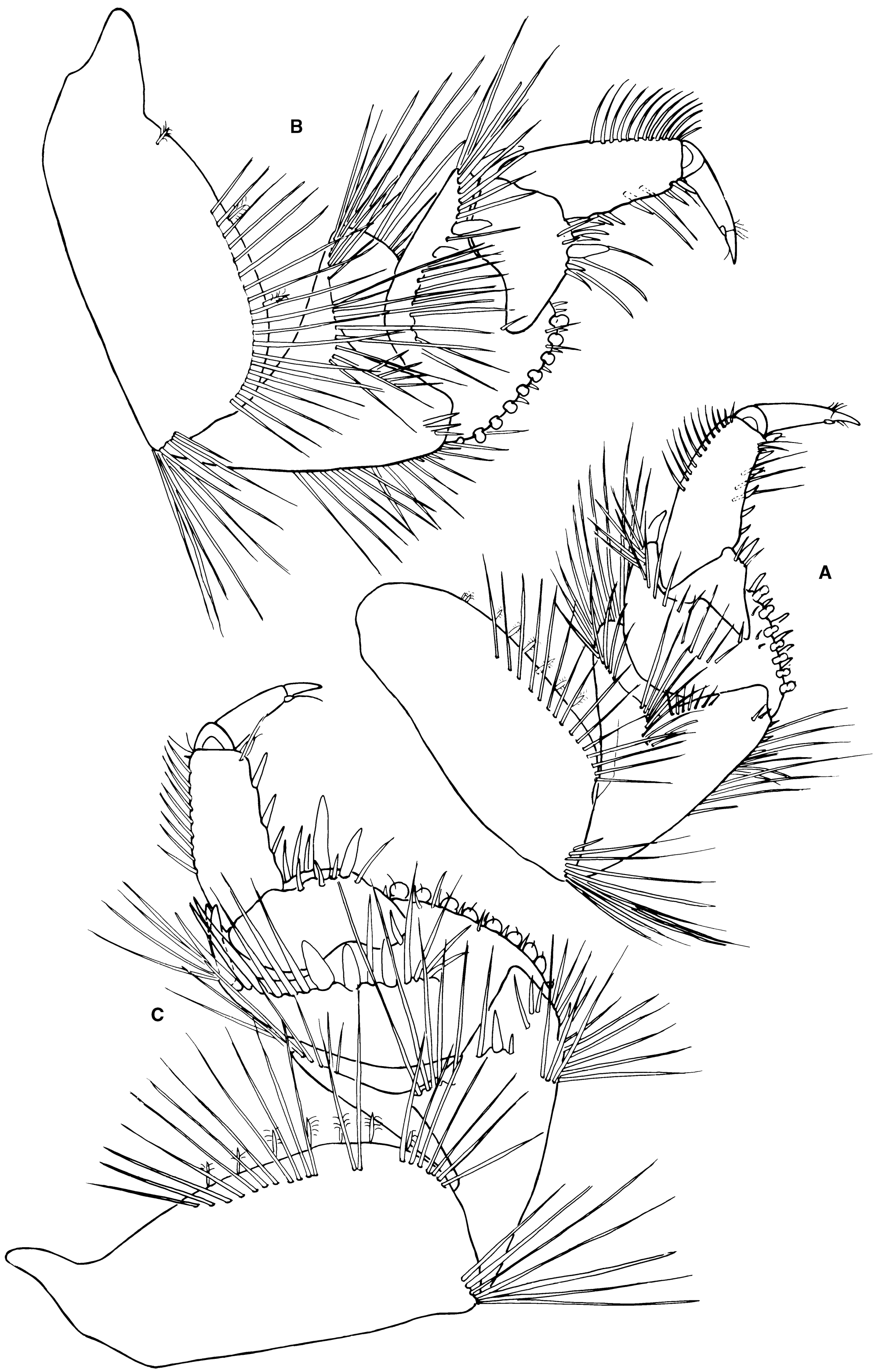

Figure 30. *Politolana concharum* female neotype: (A–C) pereopods 1–3, respectively.

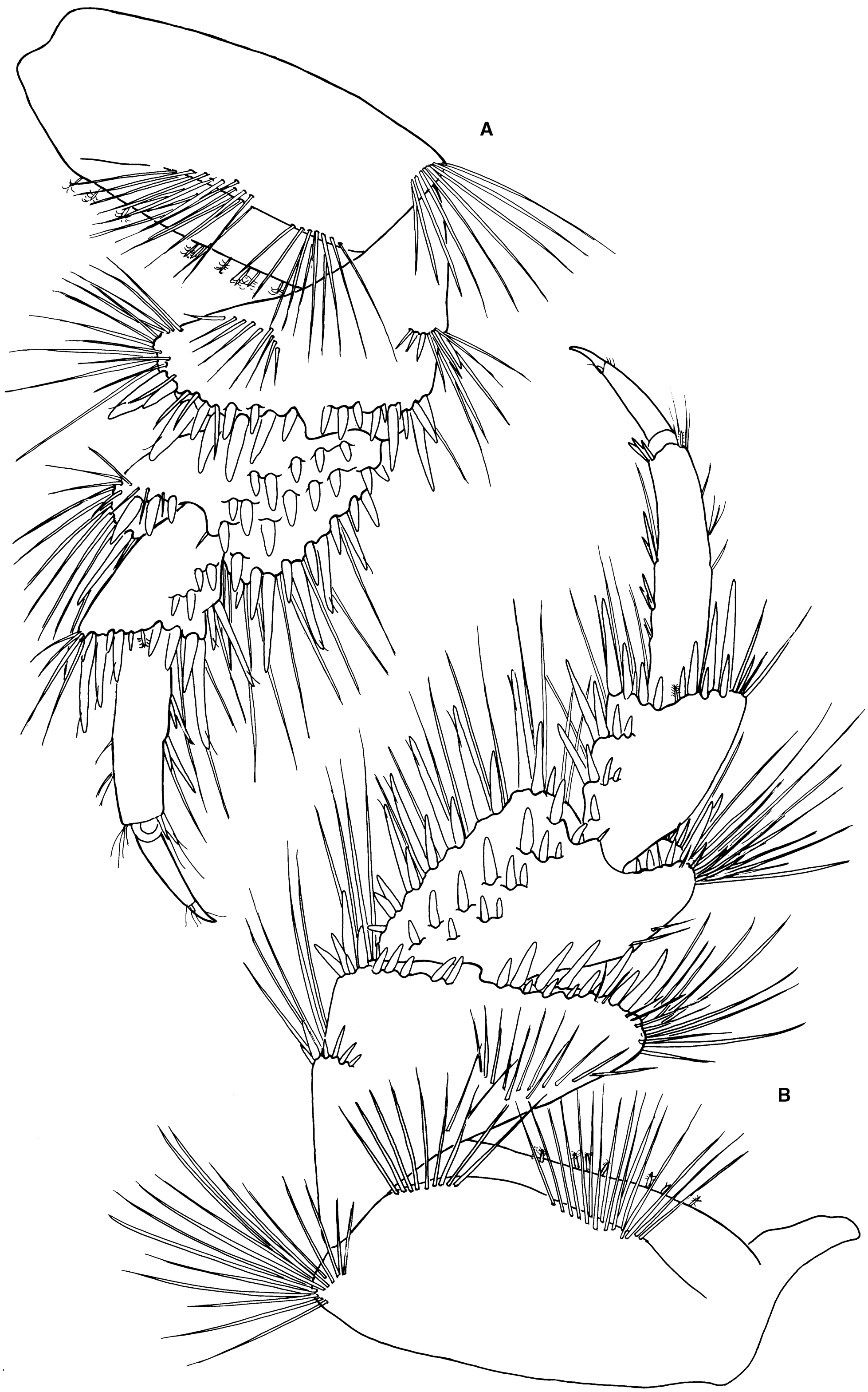

Figure 31. *Politolana concharum* female neotype: (A, B) pereopods 4 and 5, respectively.

Figure 32. *Politolana concharum* female neotype: (A, B) pereopods 6 and 7, respectively.

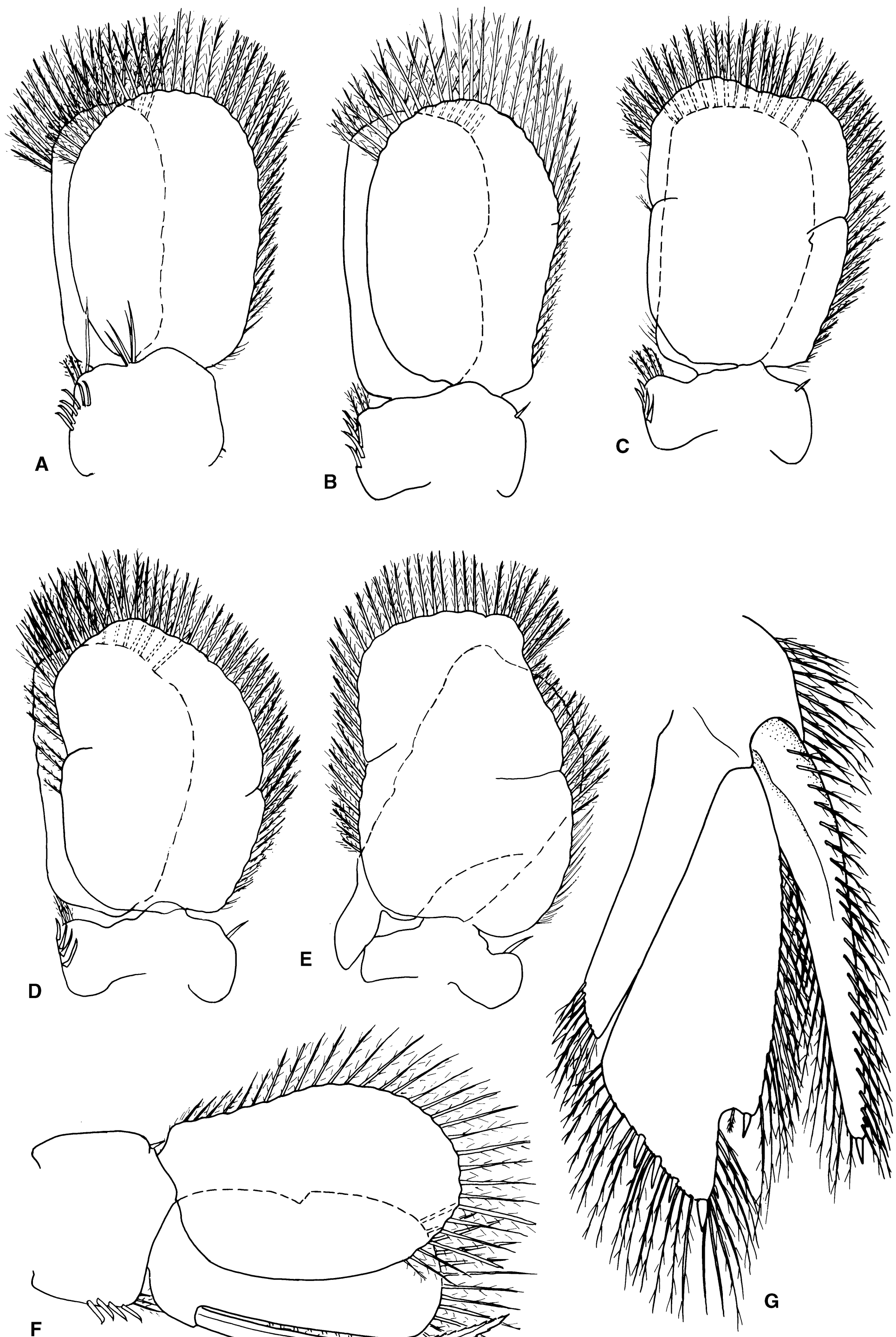

Figure 33. *Politolana concharum* female neotype: (A–E) pleopods 1–5, respectively. *Politolana concharum* male (MCZ#6797): (F) pleopod 2. *Politolana concharum* female (USNM 288411): (G) uropod.

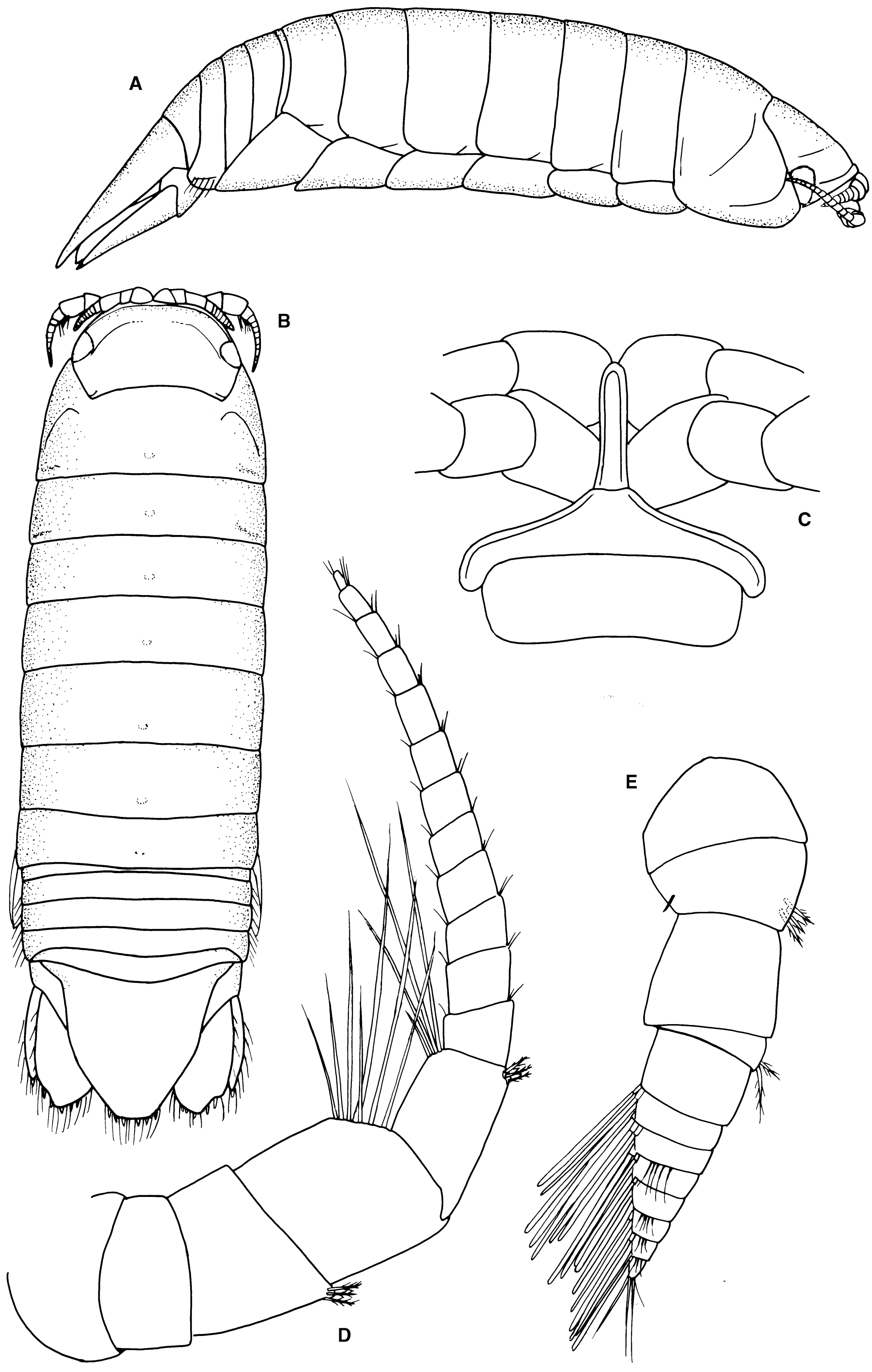

Figure 34. *Politolana micropthalma* female (ZM#F15280): (A) lateral aspect; (B) dorsal aspect; (C) frontal lamina; (D) antenna; (E) antennule.

Figure 35. *Politolana micropthalma* female (ZM#F15280): (A) left maxilliped; (B) right mandible; (C) maxillule; (D) maxilla; (E) pereopod 1.

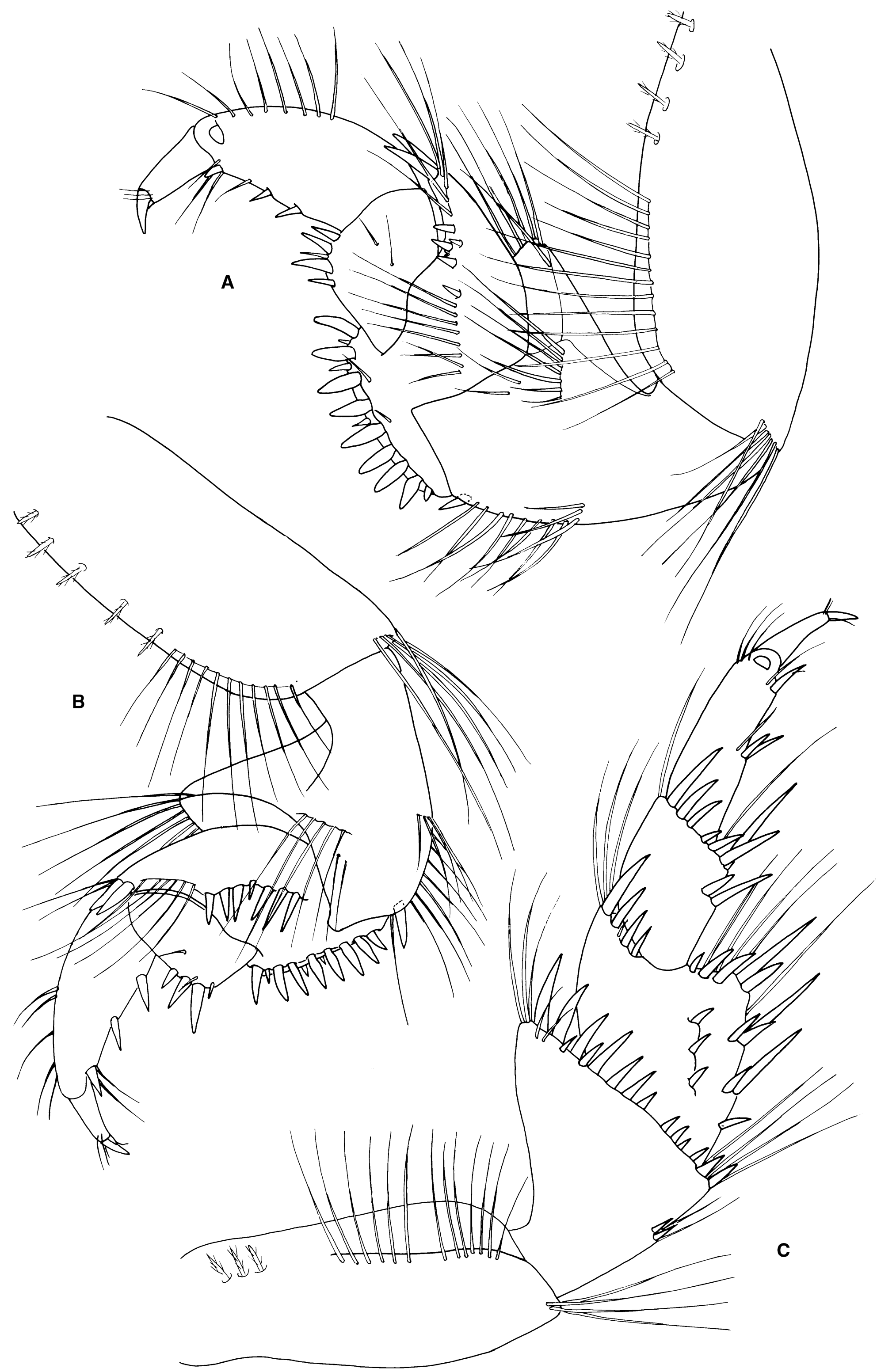

Figure 36. *Politolana micropthalma* female (ZM#F15280): (A–C) pereopods 2–4, respectively.

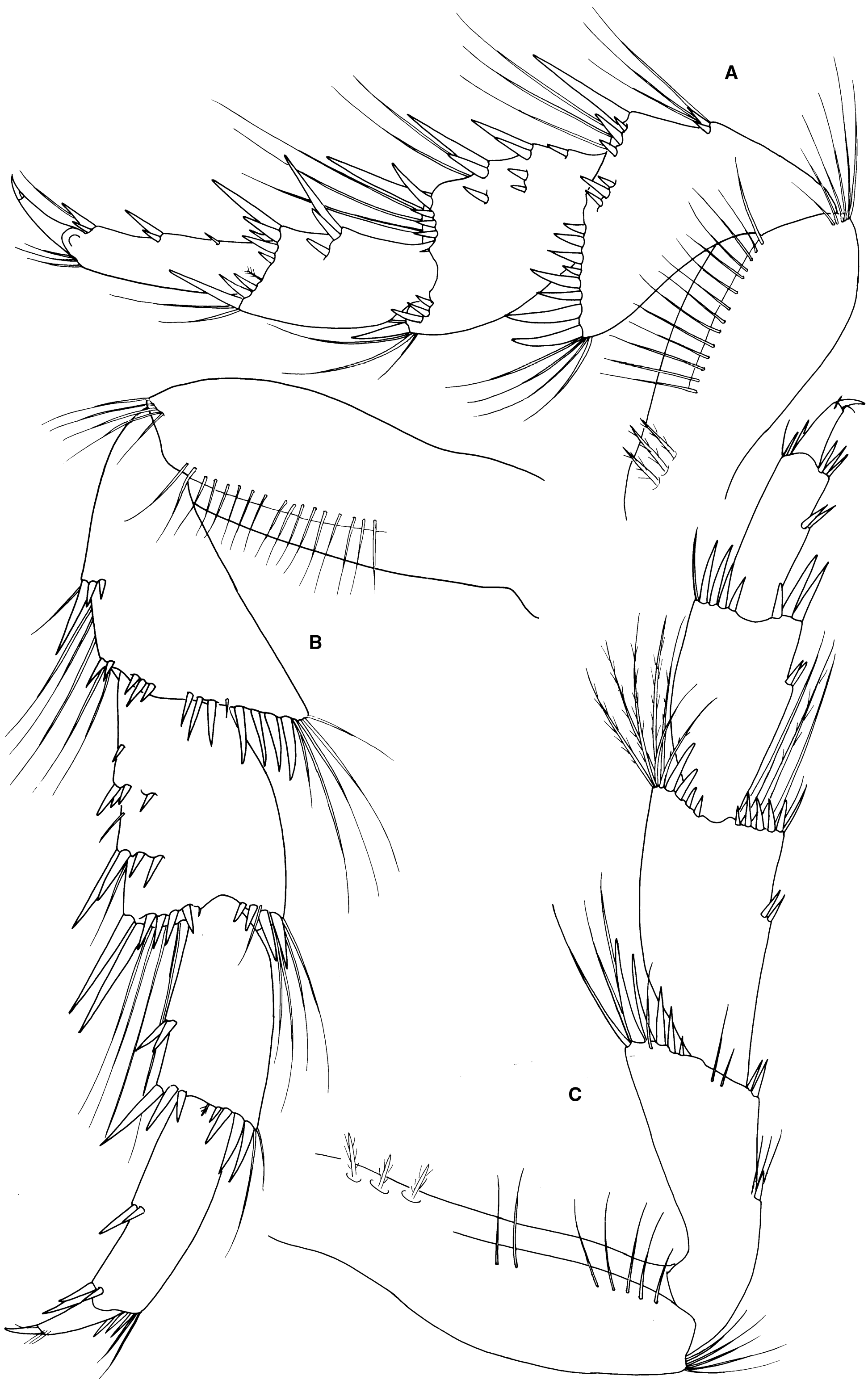

Figure 37. *Politolana micropthalma* female (ZM#F15280): (A–C) pereopods 5–7, respectively.

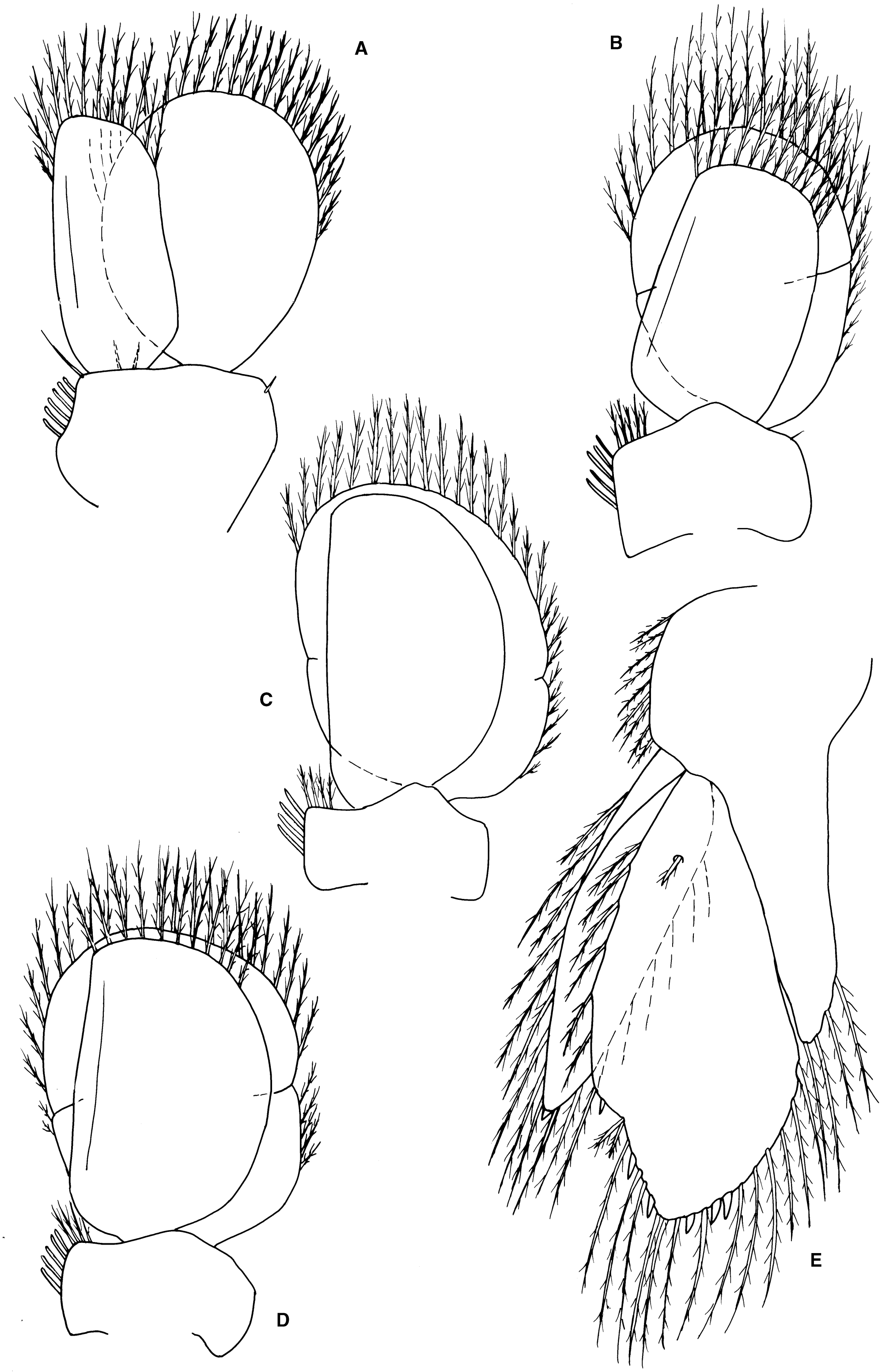

Figure 38. *Politolana micropthalma* female (ZM#F15280): (A–D) pleopods 1–4, respectively; (E) left uropod.

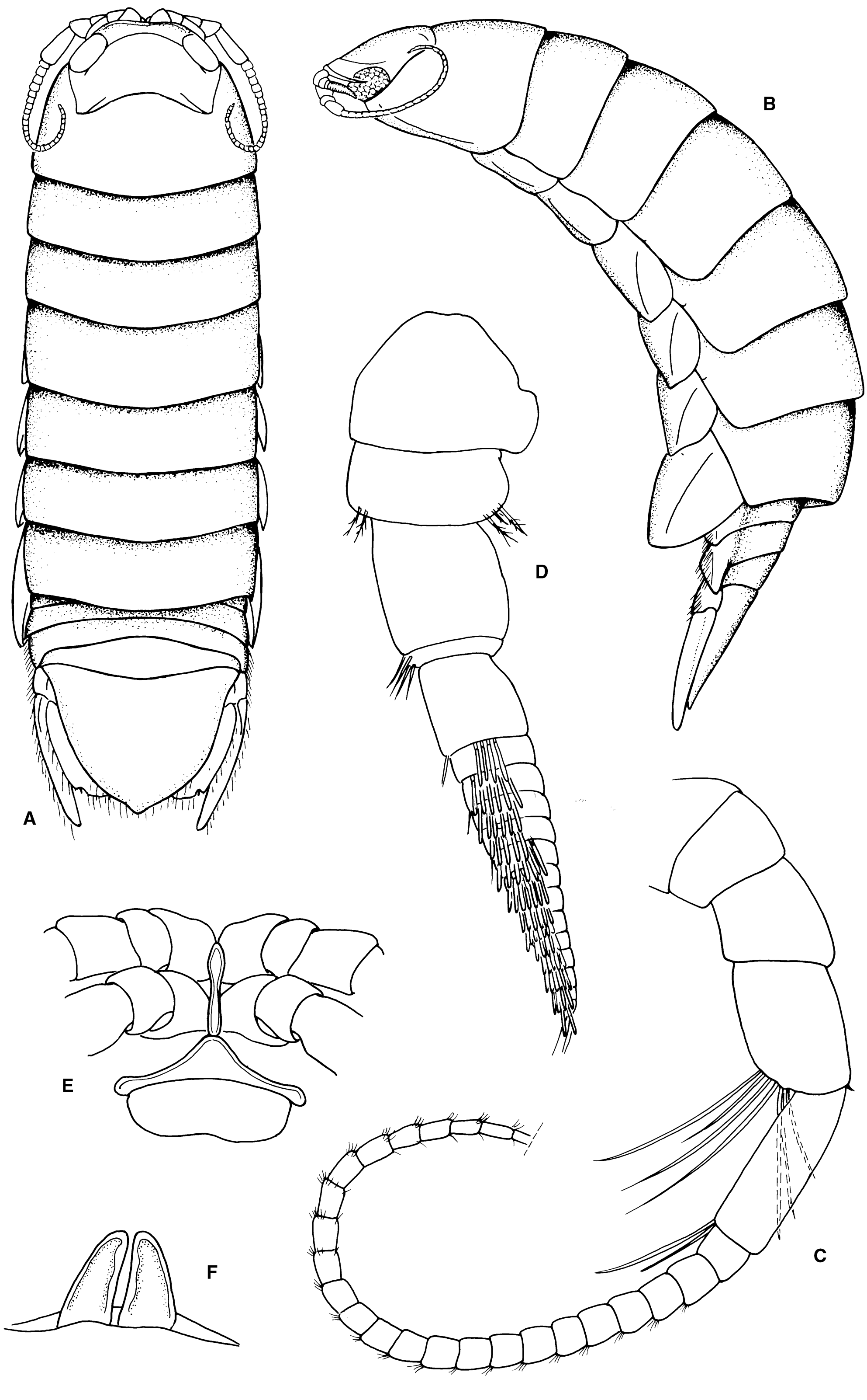

Figure 39. *Politolana eximia* male lectotype: (A) dorsal aspect; (B) lateral aspect; (C) antenna; (D) antennule; (E) frontal lamina; (F) penes.

Figure 40. *Politolana eximia* male lectotype: (A) maxilla; (B) maxillule; (C) left uropod; *P. eximia* typically have long simple setae at apex of uropod exopod that have been abraded off the type specimen and are not figured here. (D) right mandible. *Politolana eximia* female paralectotype: (E) right maxilliped.

Pereopods 1–3: Robust and highly setose. Ischium only moderately produced into scoop-shaped lobe. Meral lobe short, just reaching base of propodus, with one (P1 and P2) or two (P3) giant apical setae; inferior margin of merus with row of distally blunt, flattened and textured setae and row of adjacent short acute robust setae. Ischial and meral lobes of pereopods 1–3 equally produced, but with inferior face of merus broadening into distinct 'palm' fringed with robust and simple setae. Pereopod 3 carpus wider than long. Superior margin of propodus with long row of simple setae. Dactyl length less than propodal length.

Pereopods 4–6: Ischium superior margin with dense simple setae; P4 merus and carpus with many short robust setae scattered on posterior face, progressively less numerous and more organized into transverse rows on P5–P7; inferior margins of merus and carpus with long and short robust setae. Carpus length subequal to width (P4) or longer than wide (P5 and P6). Propodus with simple setae on superior margin.

Pereopod 7: Length subequal to P6. Similar to P6 except: with slender distally biserrate setae on superior distal angles of merus and carpus; posterior face of merus and carpus less setose.

Pleopods: Pleopod 1 peduncle subquadrate, with six plumose coupling hooks; endopod width about one-half of exopod width. Pleopod 2 peduncle with five plumose coupling hooks. Pleopods 3 and 4 each with four plumose coupling hooks.

Uropod: Peduncle medial production distally blunt or truncate, with seven long plumose setae confined to apex; peduncle ventral distal lateral corner with robust acute seta in lateral setal row. Endopod apex triangular or subacute, with large apical robust seta, distal margin with 3–4 slightly smaller robust setae and PMS. Exopod shorter than endopod, but reaching beyond endopodal notch, narrow and rounded, curved medially; apex with one large robust seta, distal lateral margin with small robust seta.

Pleotelson: Posterior margin broadly convex, posteromedial region truncated or emarginate, with PMS; flattened or emarginate region flanked on each side by two large robust setae set in distinct marginal scallops.

Sexual dimorphism. Males and females similar. Males with appendix masculina of relatively constant width, narrow, tapering evenly to slightly curved apex, extending beyond distal margins of endopod and exopod.

Variation. One of the distinctive characters of this species is the truncated or emarginate posterior margin of the pleotelson. However, the degree of emargination varies such that in some individuals it is only barely truncated. If viewed in the dorsal aspect, these specimens have a slight longitudinal depression in the posteromedial pleotelson, distinguishing them from specimens of P. impostor. On larger animals the distal emargination of the pleotelson becomes distinct. In all cases, four robust setae are present on the pleotelson distal margin and are large compared with those of other species. The interocular furrow varies from almost absent to complete. Most specimens have two coupling hooks on both maxilliped endites; however, larger animals may have three coupling hooks on each.

Size range. Adults: 9.5–32 mm.

Remarks. *Politolana concharum* is easily distinguished from other *Politolana* by the triangular shape of the eyes and the narrow uropod exopod (more than 5× longer than wide). *Politolana polita* has a similar uropod exopod, but can be easily recognized by its reduced frontal lamina and short antennae, which only reach the posterior margin of the cephalon.

A recent study by Rachlin & Warkentine (1997) evaluated the population structure of *P. concharum* by examining specimens collected from Atlantic sturgeon gut contents. The area where the study was conducted supports four very similar species of *Politolana*, one of which was undescribed before now. The authors did not provide any definitive features by which they identified the specimens, but report to have used Smithsonian Institution specimens as vouchers. Our examination of Smithsonian Institution material shows a high percentage of *Politolana* material to be misidentified. However, some of the literature they report using for species identification has accurate figures of *P. concharum* in which key diagnostic features can be seen. Therefore it is possible (although not certain) that the animals were correctly identified. They report a sex ratio of 1:1.68 female:male among their samples. This skewed sex ratio is consistent with our observations. They observed a size range of 8–31 mm, close to the range we observed.

As with *P. polita*, Stimpson's original description of this species was brief and lacked figures. Because of the inadequate description, and the subsequent loss of type material, there has been confusion regarding this species since its original description (see Remarks section for *P. polita*). *Polita concharum* often co-occurs with *P. polita* and *P. impostor*, and museum specimens are frequently misidentified among these three species. Thus there is a need to define *P. concharum* objectively and we herein designate a neotype to do so, and to clarify the taxonomic status of this species.

Distribution. Along the Atlantic coast of North America from about 22°N to 44°N, generally at depths of 25–90 m. While Stimpson described this species from Charleston, SC, the majority of *P. concharum* specimens have been collected from New England waters, especially in the regions of Cape Cod, Martha's

Vineyard and Georges Bank. In these areas *P. concharum* has been collected at depths of 0–121 m, but has been typically found between 25 and 90 m and has occasionally been collected together with *P. polita* and *P. impostor*. *Politolana concharum* records south of Cape Hatteras are rare, and many of these specimens were collected at significantly greater depths (183–317 m) than is typical in the northern portion of the range, suggesting a trend of latitudinal or isothermal submergence in this species.

Redescription of P. micropthalma (Hoek, 1882)
(Figs 34–38)

Synonymy. Cirolana cranchi: G.O. Sars (1872) (not seen). *Cirolana micropthalma*: Hoek (1882): 28, pl. 2, Figs 13–17; (G).O. Sars (1885); (1899): 71–72, pl. 30, Fig. 1; Dollfus (1903): 9; Hansen (1905): 349–350; Jones (1979): 318–320, Fig. 1; Kussakin (1979): 201–203, Figs 79, 80. *Cirolana concharum*: G.O. Sars (1885) (not seen). *Politolana micropthalma*: Bruce (1981a): 959.

Type material. Hoek's (1882) holotype was an immature male; col. 8 July 1879: deposition unknown.

Type locality. 73°13.5′N, 30°42′E, 304 m.

Material examined. ZM#F15280: Storeggen on western coast of Norway, 92 m; 1 female. ZM#F10220: col. by Sars; permanent slide of appendages. USNM#288409–288410: North Sea, 56°24′N, 02°07′E, 82 m, col. by Shell U.K. Exploration & Production; 1 female, 1 juvenile.

Diagnosis. Pereon and pleon convex and tightly articulated, all pleonites visible. All coxae without lateral or oblique impressions; coxae 6 and 7 subequal in length. First pereonite with distinct mid-lateral oblique impression. Cephalon anterior margin medially straight with minute medial point; lateral margins of frontal ridge reaching but not dividing eyes; interocular furrow incomplete medially. Eyes small, rounded triangles. Antennae short, reaching anterior region of first pereonite. Mandible molar process with spines on anterior margin touching at their bases. Pereopods 1–3 with superior distal angles of ischium and merus moderately produced; inferior margin of merus with row of robust subacute setae. Uropod endopod distal margin broadly subacute, with PMS and five small robust setae, without giant apical seta; notch on medial margin shallow, not excised. Exopod shorter than endopod flat and peltate. Pleotelson with narrow truncate distal margin, with PMS and four very small robust setae.

Description of female (ZM#F15280). Ten millimetres long; body broad, with length about 3.5 × width. Pereon cuticle highly polished; cream colour in alcohol, without any apparent pigment or chromatophores on pereon and pleon.

Cephalon: Minutely punctate. Anterior margin medially straight with minute medial point; lateral margins of raised frontal ridge reaching, but not dividing eyes. Interocular furrow incomplete medially. Eyes small, rounded triangles, slighter wider dorsally than ventrally, lightly pigmented. Frontal lamina narrow, length about 4.5 × greatest width, with lateral margins parallel, anteriorly rounded; frontal lamina and clypeus with lateral margins raised as thickened ridges.

Antennule: Peduncle cuticle with microscopic ovate macula; peduncle article 2 posterior distal angle with several short palmate setae. Flagellum composed of eight articles, each bearing 4–5 aesthetascs, some articles with additional cluster of short simple setae; first flagellar article longest, slightly wider than long, width of subsequent articles about 3× length.

Antenna: Short, reaching anterior region of pereonite 1; peduncle articles 3–5 subequal in length; article 3 length subequal to width, widening distally; article 4 subquadrate, posterior distal angle bearing row of approximately seven long stiff simple setae; article 5 about 1.5× longer than wide, posterior distal angle bearing about five long stiff simple setae; flagellum of 12 subquadrate articles.

Mandible: Molar process medial surface with fine setae; spines on anterior margin numerous, closely spaced, touching at their bases; submarginal setal row with long lightly plumose setae extending from proximal cluster.

Maxilliped: Endite with distal cluster of approximately 10 robust circumplumose setae; right and left endites with two coupling hooks. Palp article 1 with submarginal cluster of long simple setae on dorsal distolateral angle; articles 3–5 with distomedial angle weakly produced.

Pereon: Body highly vaulted. Medially, pereonite 1 longest, 2 and 3 slightly shorter than 4–6, 7 shortest; in dorsal aspect pereonite 1 narrows markedly anteriorly to encompass cephalon; with distinct impression curving to lateral margin and distinct mid-lateral oblique impression; anterolateral margins straight forming blunt anterior angles. All coxae without lateral or oblique impressions; coxae 4 posterior margin subquadrate; coxae 4–7 posterior margins oblique, progressively more extended posteriorly, coxae 6 and 7 subequal in length, with acute posterior angles, coxae 7 extended to pleonite 4.

Pleon: Pereonite 7 tightly overlapping only anterior portion of first pleonite. Dorso-ventrally vaulted similar to pereon. Epimeres ventrally and posteriorly produced, but not laterally flared; epimeres 2–4 bearing sparse lateral setal fringe. Ventral flanges posteriorly obscured by dorsal epimeres, ventral posterior angles rounded.

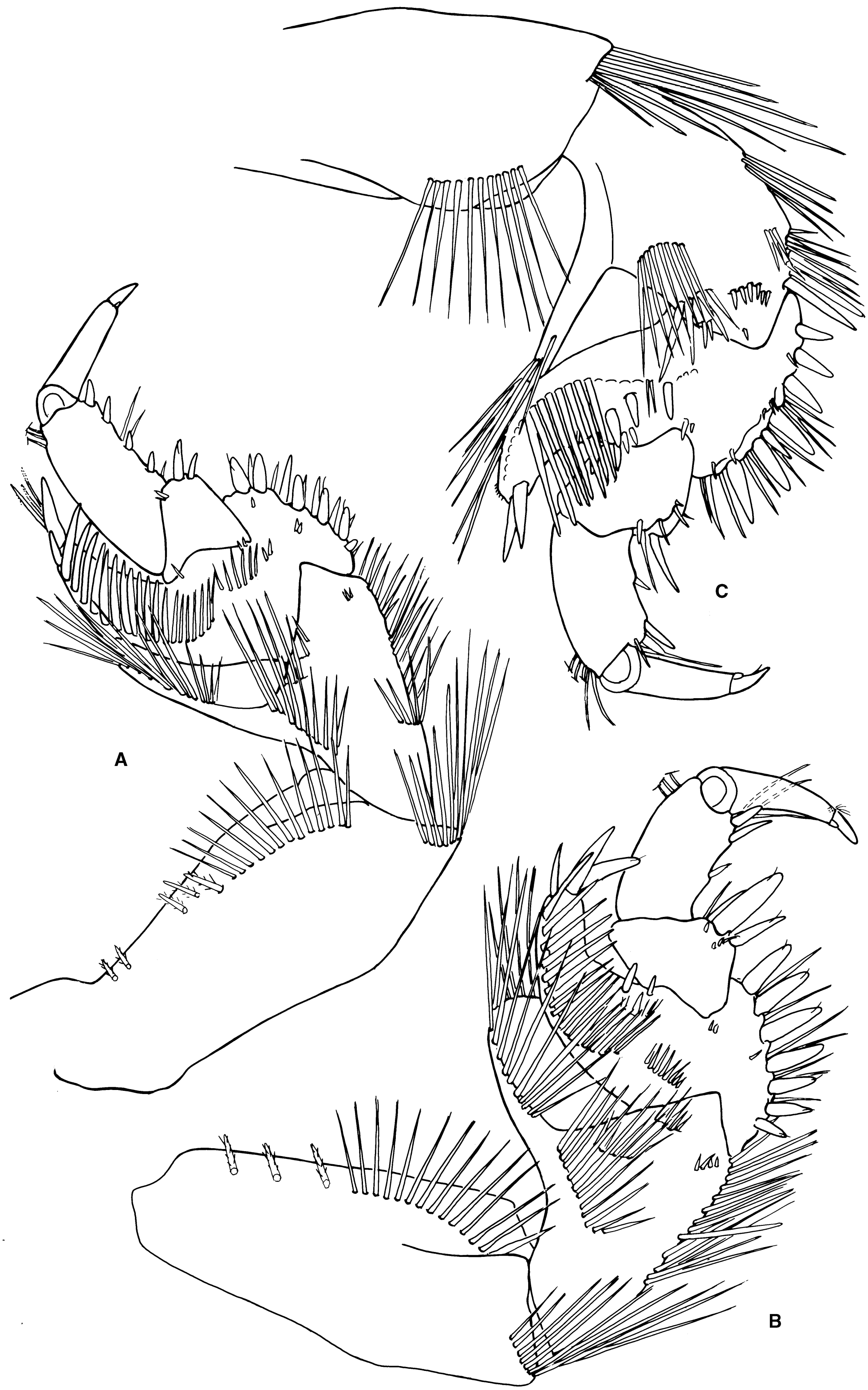

Figure 41. *Politolana eximia* male lectotype: (A–C) pereopods 1–3, respectively.

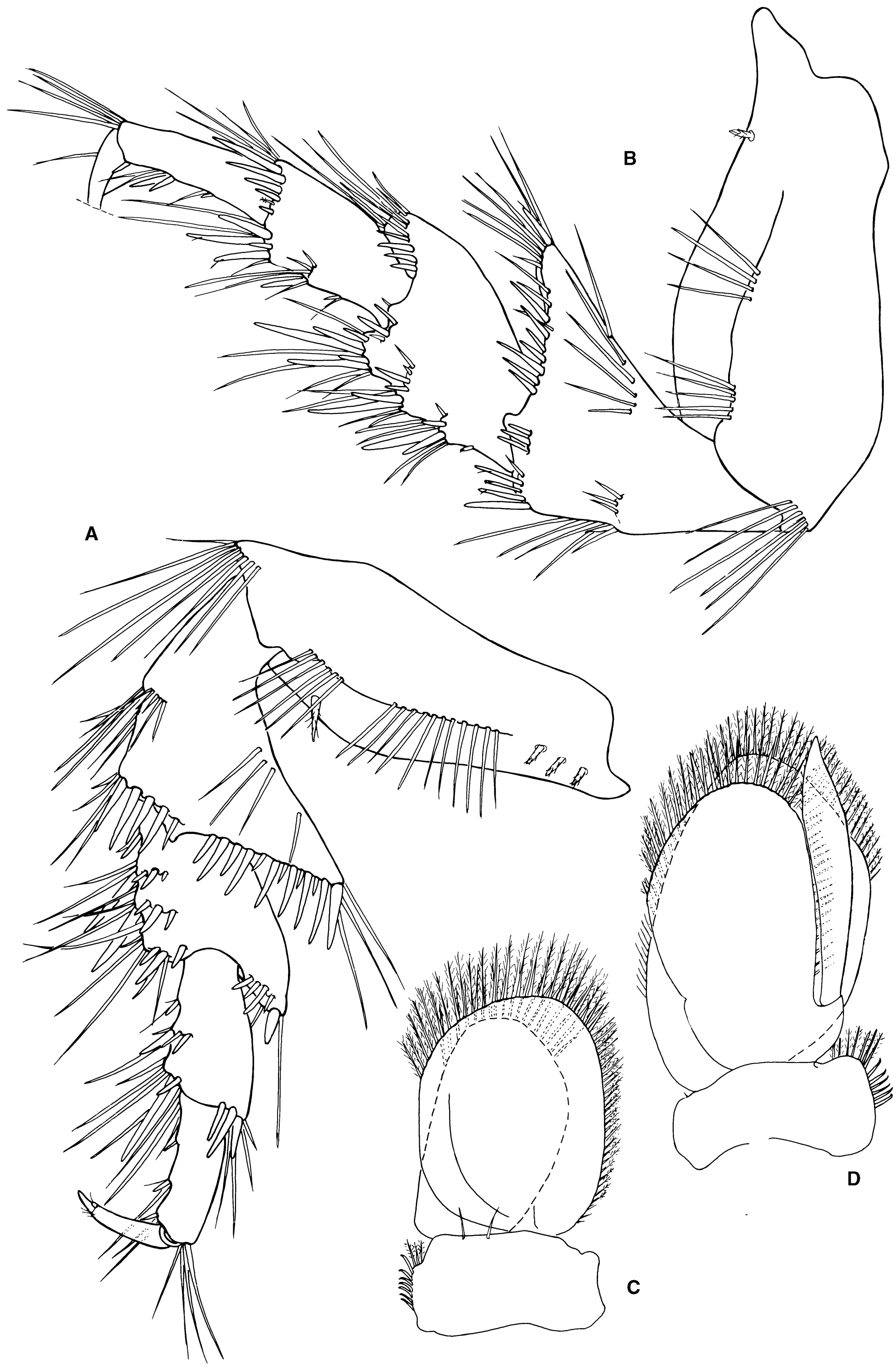

Figure 42. *Politolana eximia* male lectotype: (A, B) pereopods 4 and 5, respectively; (C, D) pleopods 1 and 2, respectively,

Pereopods 1–3: Basis with 3–4 stout flexible circumplumose setae on proximal superior margin. Ischium only moderately produced into scoop-shaped lobe; posterior face of ischium with one submarginal and one oblique row of simple setae; inferior margin with long simple setae. Meral lobe short, just reaching base of propodus, with two giant apical setae; inferior margin of merus with row of robust subacute setae and adjacent row of short acute robust setae. Ischial and meral lobes of pereopods 1–3 equally produced. Pereopod 3 carpus wider than long. Superior margin of propodus with long row of simple setae. Dactyl length less than propodal length.

Pereopods 4–6: Ischium superior margin without setae; P4 merus and carpus with robust setae in clusters on posterior face, arranged in transverse rows on P5–P7. Pereopod 4 carpus slightly longer than wide, lengthening on posterior pereopods. Propodus without simple setae on superior margin.

Pereopod 7: Similar to P6 except: longer, superior distal angle of merus with long slender plumose setae and short robust acute setae.

Pleopods: Pleopod 1 peduncle subquadrate, with six coupling hooks; endopod width about one-half of exopod width. Pleopod 2 peduncle with five plumose coupling hooks; endopod width less than exopod width. Pleopod 3 with five plumose coupling hooks. Pleopod 4 with four plumose coupling hooks.

Uropod: Peduncle medial production distally truncate, apex with 4 PMS. Endopod distal margin broadly subacute, with PMS and five small robust setae, without giant apical seta; notch on medial margin shallow, not excised. Exopod shorter than endopod, reaching endopodal notch; flat, peltate: lateral margins convex; apex with very small robust seta, medial and lateral margins without robust setae.

Pleotelson: Narrowing to truncate posterior margin, with PMS and four very small robust setae confined to narrow posterior margin.

Variation. Most of the variation observed (density of setation, pronunciation of cuticular sculpting, etc.) is likely due to size and age differences, as the three available specimens differ significantly in this regard. The largest female has the cephalon more encompassed by the first pereonite, and the cuticular ridges on the cephalon, first pereonite and lateral margins of the pereonites are more pronounced. In addition, the cephalon frontal margin is slightly more concave medially, the eyes are smaller in relation to the cephalon, and the cuticular ommatidial facets are absent. Maxilliped endites with 1–2 coupling hooks.

Sexual dimorphism. We examined only females. Hoek's (1882) and Kussakin's (1979) figures and descriptions of male specimens agree with our description of the female. Sars (1899) figures the appendix masculina as narrow, tapering evenly and extending beyond the distal margin of endopod.

Size range. Adults: 10–33 mm.

Remarks. The most recent treatment of this species (Jones, 1979) provides a short review of the previous literature and the first description providing characters separating *P. micropthalma* from the similar west Atlantic species, *P. concharum* and *P. impressa*. While *P. micropthalma* was figured by Hoek (1882), Sars (1899), Kussakin (1979) and Jones (1979), many of the appendages have remained unfigured until now.

We have been unable to locate Hoek's original specimen, an immature male, and no reference to this specimen has been made other than in the original description. This species appears to be rare with only seven specimens ever referred to in the literature. Of these seven, we have only been able to locate and examine the two specimens Jones described, and a single female Sars examined. Hoek noted in his original description that some specimens of *P. micropthalma* may have been recorded as *Cirolana borealis* prior to 1882.

Of the three specimens available to us, we chose to figure the small female that Sars had examined because the other two specimens are gravid or immature. It should be noted, however, that this specimen is the smallest recorded adult, much smaller than Hoek's 23 mm type, and it was collected from less than 100 m, which is one of the shallower recorded depths for this species.

Distribution. Eastern Atlantic upper boreal species. Found off the Norwegian coast, from 56°24′N to 73°13′5′N and 02°07′E to 36°15′E, at depths of 82–440 m. *Politolana micropthalma* is the only *Politolana* species found in the east Atlantic.

Redescription of P. eximia (Hansen, 1890)
(Figs 39–43)

Synonymy. Cirolana eximia: Hansen (1890). *Politolana eximia*: Bruce (1981a): 159; Riseman et al. 2000.

Type material. Male lectotype, female paralectotype, herein designated from syntype series, ZMUC#CRU591, Col. 25 May 1890.

Type locality. Brazil.

Additional material examined. Research Collection of A.M. Pires (Universidade de São Paulo): Brazil, 300–350 m, col. by A.M. Pires; 3 females (form a). Research Collection of A.M. Pires (Universidade de São Paulo): Brazil, 350–380 m, col. by A.M. Pires; 2 females (form a). Research Collection of A.M. Pires (Universidade de São Paulo): south-eastern Brazilian shelf, 30°S, 48°W, 50 m, col. by A. M. Pires: 1 male, 1 female (form a). NMB#MNRJ3690: North of Sant'Ana Island, 22°25′S, 40°43′W; 1 male (form a). Series of specimens from Uruguay, offshore from Punta del Diablo, from stomach contents of La Plata dolphin (Pontoporia blainvillei), col. by R.L. Brownell Jr.—USNM#211081: 25 May 1971; 1 female (form b). USNM#211082: 25 May 1971; 1 female (form a). USNM#211083: 18 March 1971; 2 females, 1 male, 1 damaged (form b). USNM#243772: Uruguay, off dolphin; 1 male (form b).

Diagnosis. Body typically broad, pereon loosely articulating with and overlapping pleon. Coxae 4–7 with distinct oblique impressions. Pereonite 1 anterolateral margins slightly sinuate, forming acute anterior point. Cephalon frontal margin medially concave without rostral point; lateral margins of raised frontal ridge dividing eyes. Antenna reaching middle of second pereonite. Eyes large, round and darkly pigmented. Pereopods 1–3 with ischium and merus superior distal angles greatly produced, meral lobe reaching midpoint of propodus; inferior margin of merus with row of broad subacute robust setae. Pereopod 7 superior distal angle of merus with dense slender plumose setae; carpus distal margin greatly expanded with width subequal to length. Appendix masculina broad and lanceolate. Uropod exopod longer than both endopod and pleotelson posterior margin, apex with cluster of long simple setae. Pleotelson posterior margin broadly convex, medially produced into small acute point.

Description of lectotype. Male, 21 mm long; body broad with length about 3.5 × width. Pereon cuticle highly polished; cream colour in alcohol with small, scattered chromatophores on pereon, pleon and pleotelson.

Cephalon: Minutely punctate, cuticle less polished than pereon due to fine texturing. Anterior margin medially concave without rostral point; lateral margins of raised frontal ridge dividing eyes. Interocular furrow complete. Eyes large, round, darkly pigmented. Frontal lamina narrow, length about 5.5 × greatest width, with hourglass shape, reaching middle of antennule peduncles. Frontal lamina and clypeus with lateral margins raised as thickened ridges.

Antennule: Peduncle article 2 posterior distal angle with several short palmate setae. Flagellum composed of 14 articles, each bearing 4–8 aesthetascs; first flagellar article longest, with length subequal to width; width of subsequent articles about twice length.

Antenna: Reaching middle of second pereonite. Peduncle articles 3–5 progressively longer; article 3 length subequal to width, widening distally; article 4 longer than wide, posterior distal angle bearing row of approximately 12 long stiff simple setae; article 5 approximately 3 × longer than wide, with width about half basal width of article 4, posterior distal angle bearing about three long stiff simple setae and 2–3 short circumplumose setae. Flagellum with 23 articles.

Mandible: Molar process dorsal surface covered with fine setae; anterior margin with spines widely spaced, not touching at their bases; submarginal setal row dense, with approximately 20 long lightly plumose setae extending from proximal cluster.

Maxilliped: Endite with distal cluster of approximately eight robust circumplumose setae; right and left endites with two coupling hooks. Basis and palp articles 1 and 2 with submarginal cluster of simple setae on distomedial angle.

Pereon: Body highly vaulted. Medially pereonite 2 slightly shorter than pereonite 1, pereonites 3–7 subequal in length, 5 and 6 slightly longer. Pereonite 1 narrowing anteriorly, with impression along lateral margin, anterolateral margins sinuate, forming acute anterior point. Coxae 2 and 3 with impression parallel to lateral margin; coxae 4–7 broadening posteriorly, with distinct oblique impressions; coxae 4 posterior margins subquadrate, coxae 5 and 6 posterior margins rounded and slightly sinuate, forming small posteroventral points; coxae 7 largest, broader and longer than coxae 6, posterior angle blunt. Posteroventral angle of pereonite 7 extending beyond posterior margin of respective coxae.

Pleon: First two pleonites loosely overlapped by pereonite 7. Pleon cuticle less polished than pereon cuticle; dorso-ventrally narrower than pereon. Pleonites 1–4 with epimeres produced posteriorly and flared laterally; epimeres 2–4 bearing dense lateral setal fringe which thickens posteriorly. Ventral flanges visible with ventral posterior angles rounded.

Pereopods 1–3: Ischium superior distal angle produced into large scoop-shaped lobe; posterior face of ischium with three oblique rows of simple setae; anterior face of ischium with two rows of transverse setae extending from inferior margin, middle of face with separate row of simple setae. Merus with superior distal angle produced into broad recurved lobe reaching midpoint of propodus, with one (P1) or two (P2 and P3) giant apical setae; inferior margin of merus with row of long blunt robust setae and row of adjacent short acute robust setae. Carpus of P2 and P3 subquadrate. Distal superior margin of propodus with short row of simple setae. Dactyl length subequal to propodal length.

Pereopods 4–6: Ischium superior margin with sparse simple setae. Posterior face of merus and carpus with robust setae arranged in transverse rows extending from inferior margin, progressively less setose posteriorly. Carpus longer than wide.

Pereopod 7: Shorter than P6. Ischium width less than meral width, superior distal angle of merus with dense long slender plumose setae, slender distally biserrate setae and short robust acute setae; merus and carpus with distal margins markedly expanded; carpus width subequal to length, at least 3× wider than proximal

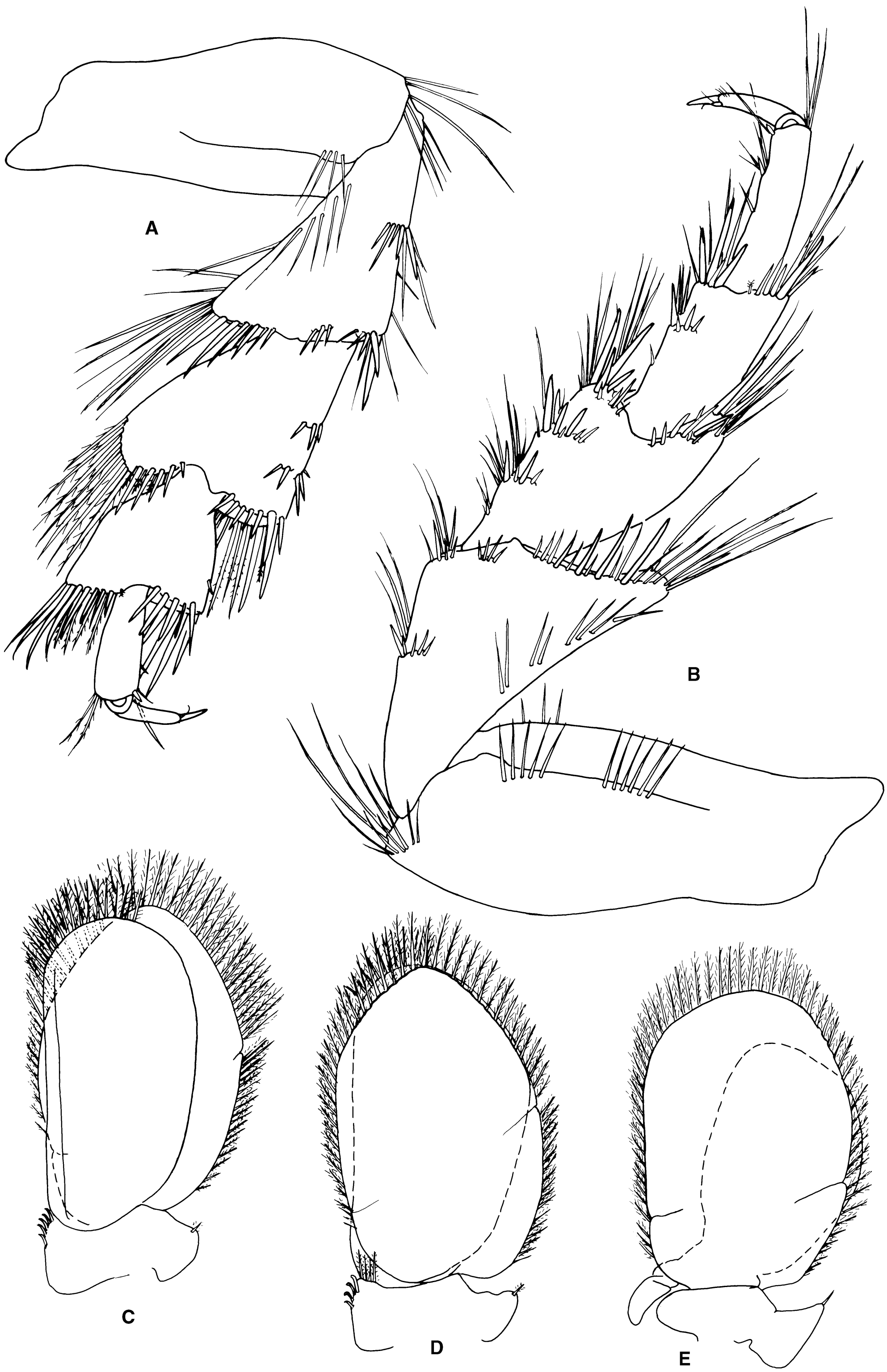

Figure 43. *Politolana eximia* male lectotype: (A) pereopod 6; (C–E) pleopods 3–5, respectively. *Politolana eximia* female paralectotype: (B) pereopod 7.

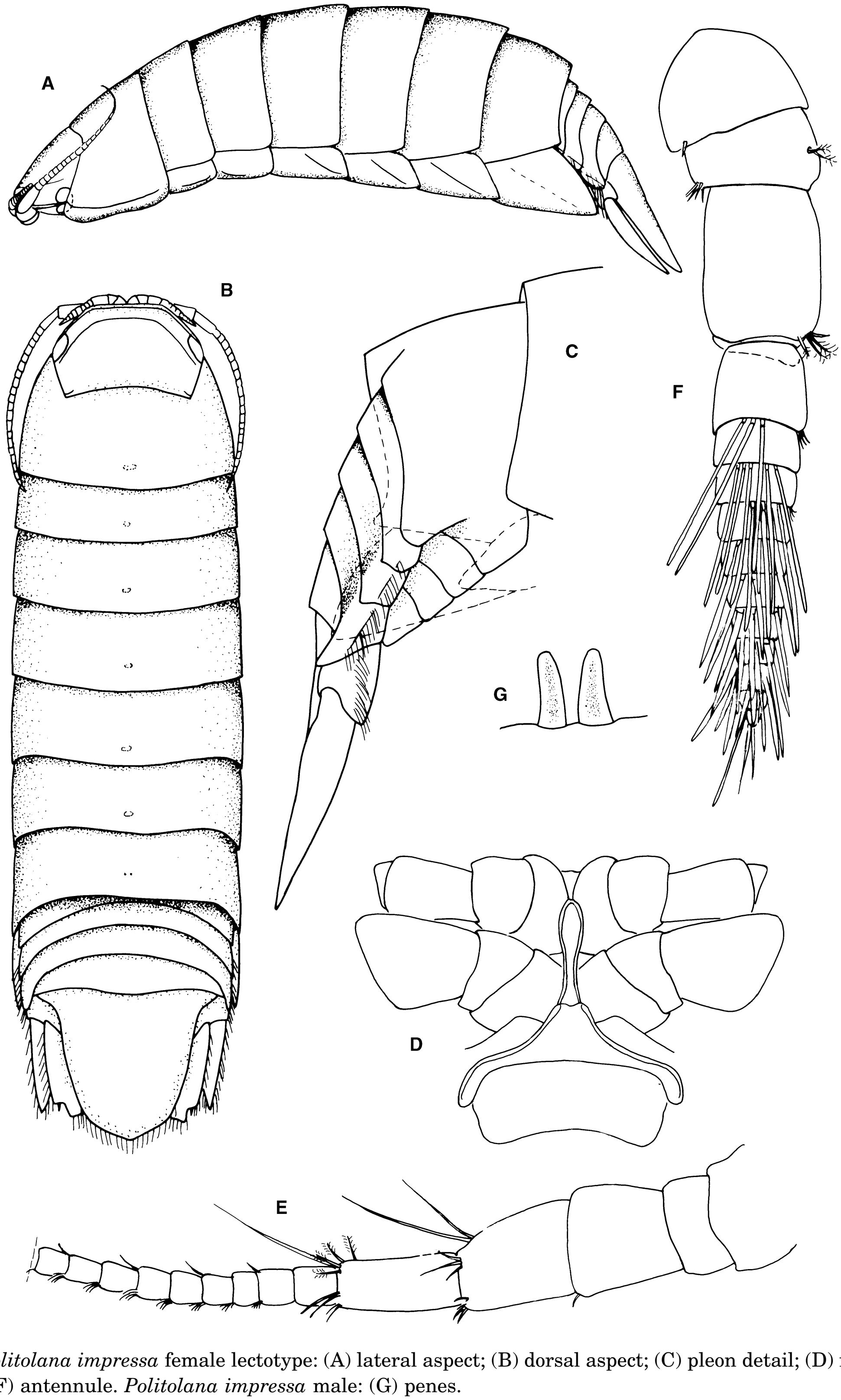

Figure 44. *Politolana impressa* female lectotype: (A) lateral aspect; (B) dorsal aspect; (C) pleon detail; (D) frontal lamina; (E) antenna; (F) antennule. *Politolana impressa* male: (G) penes.

propodal width. Propodus short, length subequal to carpal length.

Pleopods: Pleopod 1 peduncle width 1.5–2 × length, with seven plumose coupling hooks; endopod width greater than half of exopod width. Pleopod 2 peduncle with six plumose coupling hooks; endopod greatest width only slightly less than exopod width; appendix masculina lanceolate: broadening from base, medial margin narrows abruptly at apex to fine extended point; reaching slightly beyond apex of exopod. Pleopod 3 with five plumose coupling hooks. Pleopod 4 with four plumose coupling hooks.

Uropods: Peduncle medial production distally acute, with 10–14 PMS on most of medial margin. Endopod distal margin broadly rounded, with PMS and 4–5 small robust setae of equal size; apex with two short simple setae, not much longer than adjacent PMS; exopod long, flat, with straight lateral margins, tapering evenly, reaching beyond both endopod and pleotelson posterior margin; apex with cluster of very long simple setae (abraded off lectotype), without robust setae on apex, medial or lateral margins.

Pleotelson: Posterior margin broadly convex with small medial point; with PMS, without robust setae (see variation section).

Variation. Politolana eximia appears to have two general body forms. One form, that of the type specimens ('form a'), is broad and slightly more rounded, with length approximately 3.5 × width. The second form ('form b') is more narrow and tubular, with the length ranging from 4.5–6.0 × width. Aside from the difference in length and shape, which upon first inspection cause these two forms to appear quite different, they share all features diagnostic of the species. Other variation, not specifically associated with one form or the other, includes the following: antenna flagellum with 22–32 articles; pleotelson posterior margin usually with 4–6 very small robust setae that appear to be lacking in the type specimens, possibly due to age and damage. Uropod endopod with 4–8 setae on distal margin. Uropod exopod apex may have a very small robust seta in addition to cluster of long simple setae. The pleotelson apex usually has a distinct medial point; however, a few specimens exhibit this shape to a lesser degree.

In addition to the above variation, several very large (27–45 mm) female specimens have been collected from 300 to 380 m in southern Brazilian waters. These specimens differ slightly in the shape of the pleotelson apex, which is more subacute rather than produced into a small medial point, and which has small robust setae (so small as to be difficult to discern); the uropod exopod is of the same form, but is not quite as long; the eyes appear slightly less round, but are still large with many ommatidia; and pereonite 7 does not overlap more than the first pleonite. Aside from these subtle differences, the large females are identical to the smaller specimens in most features, and are clearly P. eximia, 'form a'.

Sexual dimorphism. Male and female similar.

Size range. 15–45 mm.

Remarks. Hansen's (1890) description (in Latin) and figures were relatively comprehensive and he identified most of the diagnostic features of this species. However, he did not figure most of the appendages or any of the mouth parts. *Politolana eximia* is distinctive and easily identified by its long uropod exopods that extend beyond both the uropod endopod and the pleotelson posterior margin. It can also be readily distinguished from the similar *P. impressa* by the prominent oblique impressions on the seventh coxae, which are absent or residual in *P. impressa*, and by the lack of studded, distally biserrate setae on the superior margins of P5–P7. Hansen's original description of *P. eximia* did not figure most of the appendages, nor any of the mouth parts. In addition, this species has two distinct morphologies, and museum collections are rare (we were able to recover only 15 specimens, aside from Hansen's original material). For these reasons, we designate and thoroughly illustrate a lectotype for *P. eximia*.

Distribution. Unfortunately, no detailed locality information was recorded for the type material of *P. eximia*, and it is known only that it is from the Brazilian coast. Of the seven lots we examined, five were from the gut contents of dolphin, which may have been collected at a distance from where the isopods were consumed. Given this lack of specific locality and depth information, we can provide only a rough distribution for *P. eximia*, inclusive of the dolphin collection localities. This area includes the south coast of Brazil to northern Argentina, from about 22°S–35°S. Of the lots available, only three lots had the collection depth recorded. These depths range from 50 to 380 m, with the giant females representing the deepest records. *Politolana eximia* generally occurs at depths greater than *P. tricacrinata*, the only other southern hemisphere *Politolana species*.

Redescription of P. impressa (Harger, 1883) (Figs 44–48)

Synonymy. Cirolana impressa: Harger (1883): 93–93, pl. 1, Figs 3, 3(d), pl. 2, Figs 3, 3(c); Verrill (1885): 559, pl. XXXVI, Fig. 165; Richardson (1900): 216 1901: 513 1905: 83, 97–99, Figs 78, 79; Schultz (1969): 184, Fig. 287; Watling et al. (1974): 347–349; Kussakin (1979): 203–205, Figs 81, 82; Jones (1979): 318–319. *Politolana impressa*: Bruce (1981a): p.959; Kensley & Schotte (1989): 140–142, Fig. 63(a)–(b).

Type material. Adult female lectotype and three paralectotypes (1 nongravid female, 2 gravid females),

herein designated from syntype series, MCZ#3906a.
Type locality. East of Cape May, NJ, 38°21′50 N, 73°32′W, 361 m.
Additional material examined. USNM#11189: off Cape Hatteras, NC, 35°21.30 N, 74°52.00 W, col. by USFC, R/V Albatross, sta. 2306; 2 females (form a). USNM#35321: E Querean, Canada, 348 m, from halibut, col. by J.W. Collins, USFC, 2 June 1879; 2 females, 1 male (form a). USNM#35930: Georges Bank, off MA, 270 m 1872: 1 specimen. USNM#236180: off Palm Beach, FL, 73.2 m, col. by Thompson & Mcginty, R/V Triton, February 1950; 2 females (form a). USNM#236182: Bahamas, R/V Iselin, cruise Cr 8007, sta. 67, 21 September 1980; 2 females (form a).

Series of specimens from off Martha's Vineyard, MA, col. by USFC R/V Fishhawk—USNM#36392: 587 m, sta. 1095, 11 August 1882; 1 female (form a). USNM#36404: 551 m, sta. 1094, 11 August 1882; 1 gravid female (form a). USNM#38127: 287 m, sta. 943 1881; 4 females, 1 male, 2 juveniles (form a).

Series of specimens from Gulf of Mexico, col. by Marfin-Geryon cruise—GCRL#1351: 27°01 N, 84°56 W, 494 m, 6 May 1987; 3 females, 4 males (form a). GCRL#1352: 28°59.10 N, 88°25.33 W, 677 m, 2 August 1987; 15+ specimens (form a). GCRL#1354: 28°59.10 N, 88°25.33 W, 677 m, 2 August 1987; 50+ specimens (form b). GCRL#1356: 29°01.52 N, 88°27.04 W, 494 m, 2 August 1987; 15+ specimens (form b). GCRL#1367: 27°54.07 N, 85°15.19 W, 494 m, 7 May 1987; 15+ specimens (form a). GCRL#1368: 677 m, locality unknown; 11 specimens (forms a and b).

Diagnosis. Body typically broad, pereon loosely articulating with and overlapping first two pleonites. Coxae 4–6 narrow, with distinct oblique impressions, coxae 7 with small punctations marking residual oblique impression. Cephalon anterior margin medially concave or straight; lateral margins of raised frontal ridge dividing eyes. Eyes large and round. Interocular furrow complete. Antennae reaching middle of second pereonite. Pereopods 1–3 with ischium and merus superior distal angles greatly produced, with meral lobe reaching midpoint of propodus, inferior margin of merus with row of narrow acute robust setae. Pereopods 5–7 posterior distal margin of ischium with studded-biserrate setae. Pereopod 6 with distal angles of merus and carpus bearing long distally biserrate setae. P6 propodus inferior margin with short acute distally biserrate setae. Pereopod 7 superior distal angle of merus with dense long slender plumose setae. Uropod endopod apex truncate; exopod shorter than endopod, peltate. Pleotelson posterior margin narrow, slightly subacute.

Description of lectotype. Female, 21 mm long; body broad, length about 3.5 × width. Pereon cuticle highly polished; cream colour in alcohol with scattered, darkly pigmented chromatophores on pereon, pleon and pleotelson.

Cephalon: With light minute punctation. Anterior margin medially concave or straight, without distinct rostral point; lateral margins of raised frontal ridge extending over and dividing eyes. Eyes small, subquadrate and darkly pigmented; sometimes with mid-anterior notch of missing ommatidial facets where divided by frontal ridge. Interocular furrow complete. Frontal lamina narrow, length about 3.1 × greatest width, with slight hourglass shape, reaching middle of antennule peduncles. Frontal lamina and clypeus with lateral margins raised as thickened ridges.

Antennule: Peduncle article 2 posterior distal angle with several short palmate setae. Flagellum composed of 11 articles, each with 4–7 long aesthetascs; first flagellar article longest with length subequal to width; width of subsequent articles about twice length.

Antenna: Reaching middle of second pereonite. Peduncle articles 3–5 progressively longer; article 3 length subequal to width, widening slightly distally; article 4 longer than wide, subquadrate, posterior distal angle bearing about two long stiff simple setae; article 5 approximately 2.5× longer than wide, with width about half the basal width of article 4, posterior distal angle bearing a few short simple setae and several short circumplumose setae. Flagellum composed of 22 articles.

Mandible: Molar process dorsal surface with fine setae, concentrated in distinct patch on distal posterior margin (Fig. 45C,E); anterior margin with spines widely spaced, not touching at their bases; molar process with submarginal setal row of long lightly plumose setae extending from proximal cluster.

Maxilliped: Endite with distal cluster of approximately three robust circumplumose setae; right endite with two coupling hooks, left endite with one coupling hook.

Pereon: Body highly vaulted. Medially, pereonite 2 shorter than pereonite 1, pereonites 3–7 subequal in length, 6 and 7 slightly longer; pereonites 1–6 with dorsal medial round depression housing two minute pores, pores present but without depression on pereonite 7; in dorsal aspect, pereonite 1 narrowing markedly anteriorly to encompass cephalon; with distinct impression along lateral margin, anterolateral margins straight forming blunt anterior angle. Coxae 2 and 3 with impression parallel to lateral margin; coxae 4–6 narrow, with distinct oblique impressions, posterior margins oblique, progressively more extended posteriorly, with acute posterior angles; coxae 7 with small punctations marking residual oblique impression, length subequal to length of coxae 6, extended to pleonite 3 or 4. Posteroventral angle of pereonite 7 extending beyond posterior margin of respective coxae.

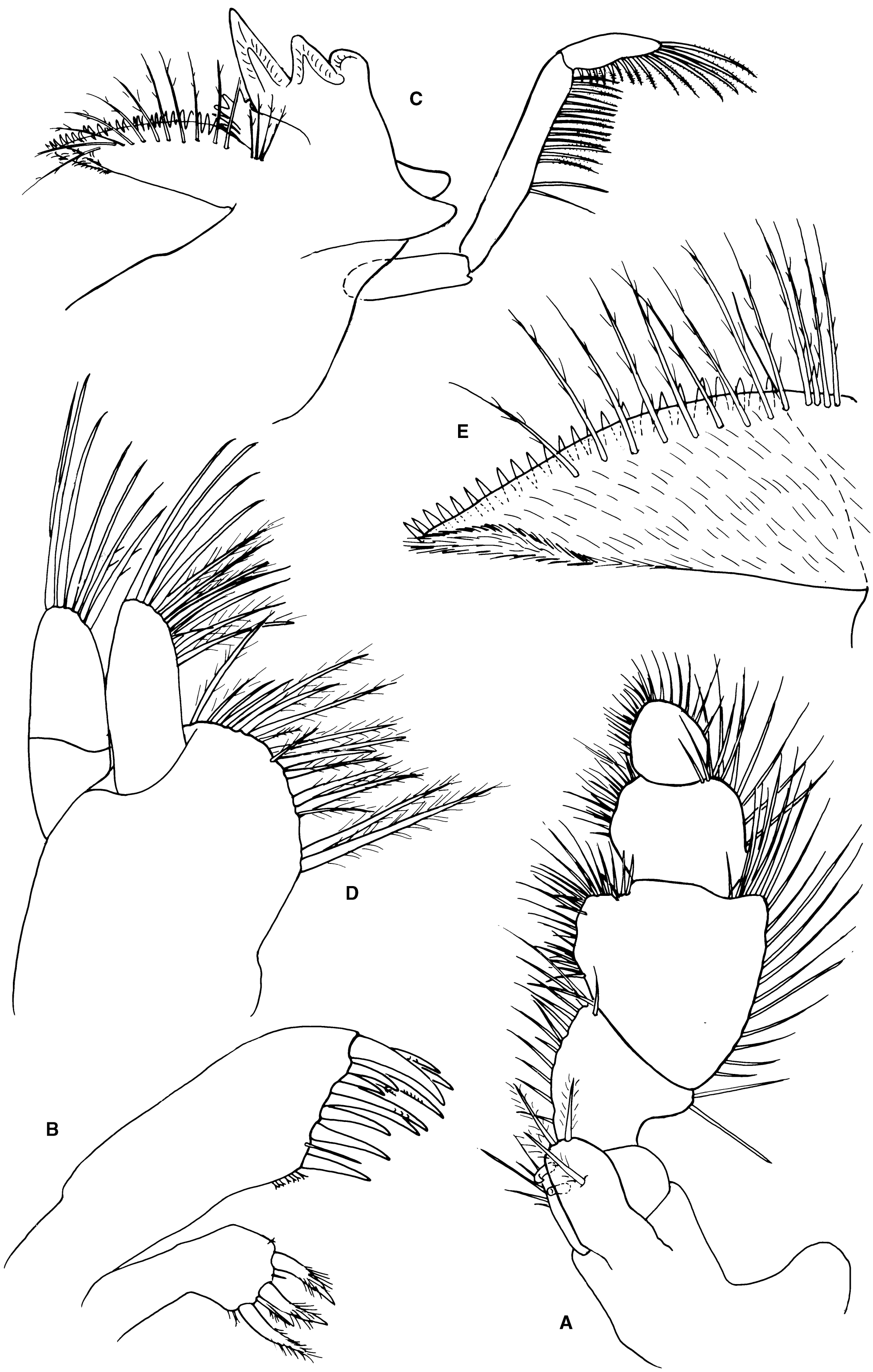

Figure 45. *Politolana impressa* female lectotype: (A) right maxilliped; (B) maxilla; (C) right mandible; (D) maxillule; (E) mandible molar process detail, anterior surface.

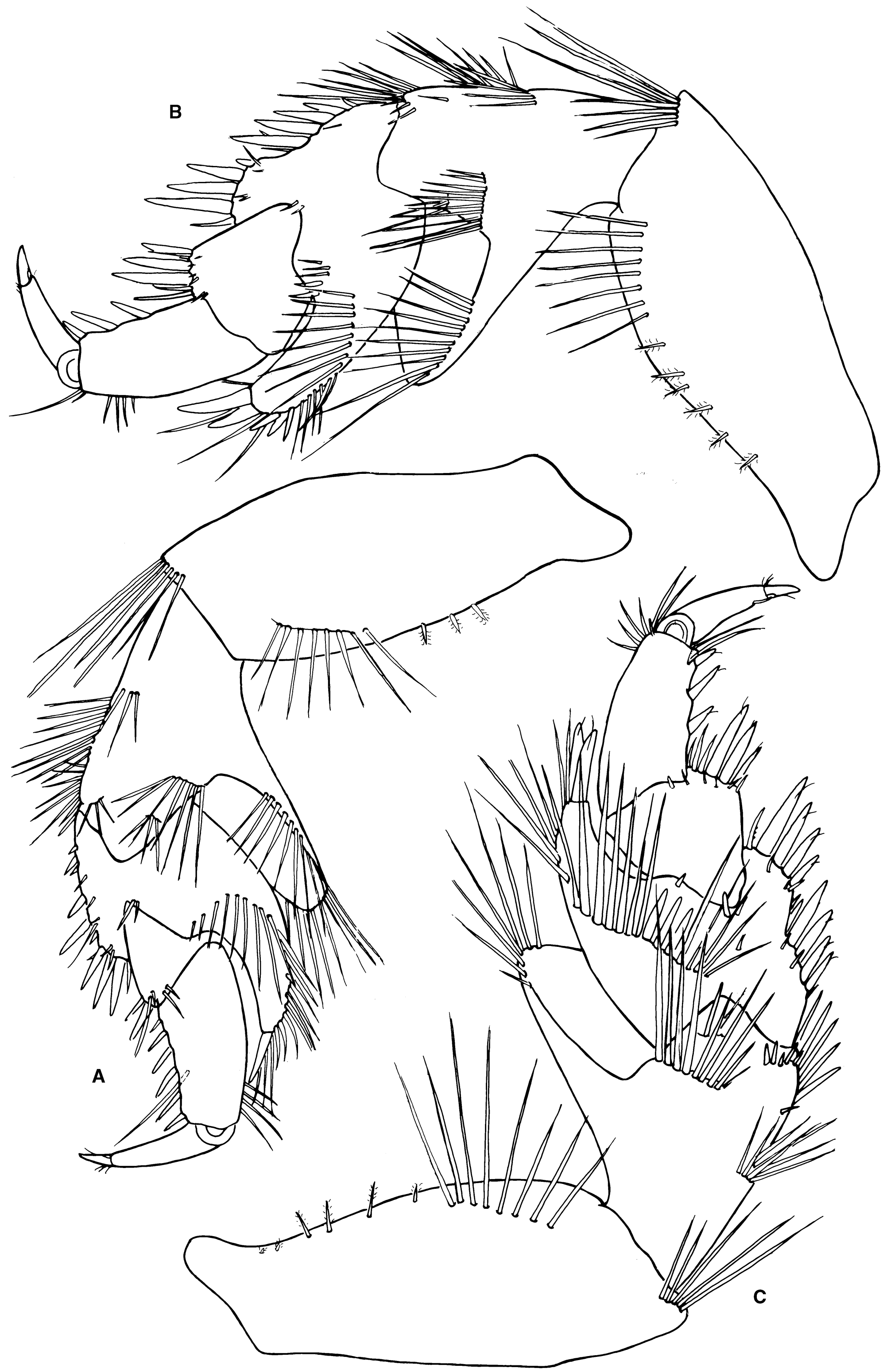

Figure 46. *Politolana impressa* female lectotype: (A–C) pereopods 1–3, respectively.

Figure 47. *Politolana impressa* female lectotype: (A, B) pereopods 4 and 5, respectively.

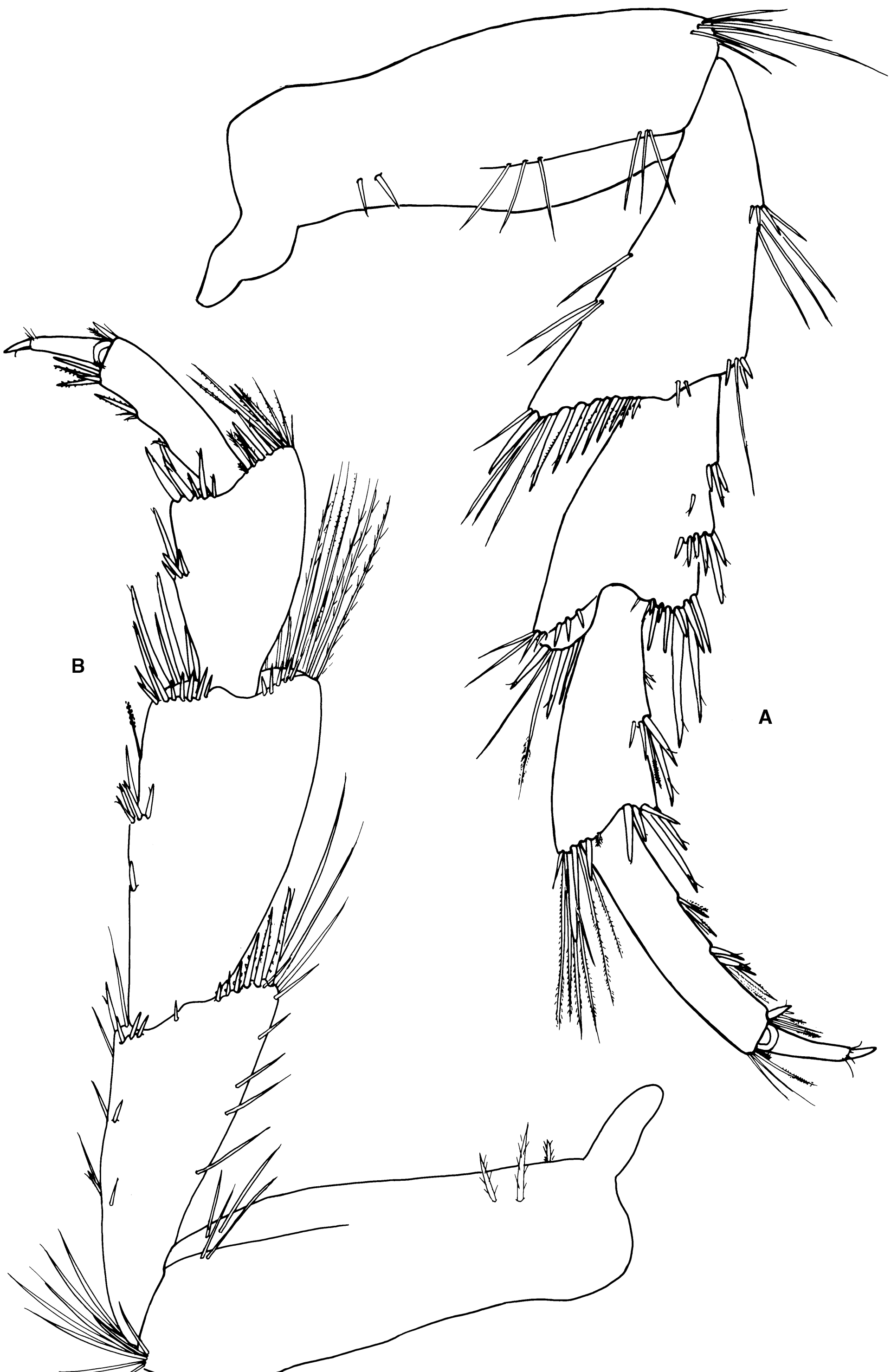

Figure 48. *Politolana impressa* female lectotype: (A, B) pereopods 6 and 7, respectively.

Pleon: First two pleonites loosely overlapped by pereonite 7; pleon cuticle less polished than pereon cuticle; dorso-ventrally narrower than pereon. Epimeres of pleonites 1–4 produced posteriorly and flared laterally; epimeres 2–4 bearing dense lateral setal fringe. Ventral flanges with ventral posterior angles rounded.
Pereopods 1–3: Ischium superior distal angle produced into large scoop-shaped lobe; posterior face of ischium with two oblique rows of simple setae. Merus with superior distal angle produced into large recurved lobe reaching middle of propodus, with one (P1) or two (P2 and P3) giant apical setae; inferior margin of merus with row of long acute robust setae and row of adjacent short acute robust setae. Ischial and meral lobes of P1–P3 progressively less produced. Carpus of P2 and P3 subquadrate. Distal superior margin of propodus with short row of simple setae.
Pereopods 4–6: Ischium superior margin with sparse simple setae; distal margin of ischium with studded-biserrate setae (absent on P4). Merus and carpus with robust setae arranged in transverse rows or clusters extending from inferior margin, progressively less setose on P5–P7. Carpus longer than wide. Pereopod 6 with distal angles of merus and carpus bearing long distally biserrate setae. Pereopod 6 propodus inferior margin with short acute distally biserrate setae and a robust studded-serrate seta on inferior distal angle.
Pereopod 7: Subequal in length to P6. Like P6 except: ischium width less than meral width; superior distal angle of merus with dense long slender plumose setae, long slender distally biserrate setae, and short acute robust setae; carpus distal margin expanded, about twice as wide as proximal propodal width.
Pleopods: Pleopod 1 peduncle subquadrate, or with length only slightly less than width, with six plumose coupling hooks; endopod width about one-half of exopod width. Pleopods 2 and 3 peduncle with five plumose coupling hooks. Pleopod 4 with four coupling hooks.
Uropod: Peduncle medial production distally acute, with 4–5 long plumose setae. Endopod apex flattened or truncate, typically with 3–4 very small robust setae, PMS and apical cluster of short simple setae (see variation section). Exopod shorter than endopod, peltate: broad, flat, with convex lateral margins; apex typically with very small robust seta (see variation section), distal medial margin with small robust setae.
Pleotelson: Faintly bent along dorsal midline; posterior margin narrow, slightly subacute, with PMS and with evidence of 2–4 small robust setae (abraded off specimen).
Sexual dimorphism. Males and females similar. Males with narrow appendix masculina, tapering evenly to narrow pointed apex; reaching beyond distal margins of pleopod 2 rami.

Variation. Larger animals may have more setation and more coupling hooks on the maxilliped endites. Antenna peduncle article 5 2–3× longer than wide; peduncle articles 4 and 5 may have more setae than are present on the lectotype, but never with dense setae. The pleotelson apex is usually subacute, but in some cases may be more evenly rounded.

The distal margins of the uropod rami and the posterior margin of the pleotelson of the type specimens have had the setae abraded off. Non-type specimens have 2–4 small (difficult to discern with a light microscope) blunt robust setae on the pleotelson apex, 3–4 small robust setae and an apical cluster of short simple setae on the uropod endopod distal margin, and a minute apical robust seta on the uropod exopod.
Remarks. *Politolana impressa* is easily distinguished from *P. polita*, *P. concharum* and *P. impostor* by the presence of oblique impressions (after which this species was named) on the coxae of pereonites 4–6. *Politolana impressa* also has eyes that are typically rounder than in these other species. It differs from *P. haneyi* in the shape of the uropod endopod, which is more truncated in *P. impressa*, the shape of the pleotelson posterior margin, which is usually subacute in *P. impressa* and evenly rounded in *P. haneyi*, and the form of the pleon, which is dorso-ventrally narrower than the pereon in *P. impressa* and vaulted in *P. haneyi*.

The majority of *P. impressa* specimens that we have examined are of the same broad form as the lectotype and paralectotypes (marked 'form a' for some lots in the material examined list). However, as in *P. eximia*, some animals have a longer more tubular body form, which can be up to 5.5× longer than wide ('form b'). The latter were collected in the Gulf of Mexico and closely resemble *P. wickstenae*, having the longer body form and more 'loosely' articulated segments. 'Form b' *P. impressa* can be distinguished from *P. wickstenae* by the absence of eyes, and the presence of simple setae along the entire distal margin (ventral face) of the maxillipedal palp in the latter.

While the two body forms noted above appear quite different, there is a gradient between the two, and at least one lot contains animals of both types, leading us to conclude that this difference is intraspecific variation. In addition, the narrow form of *P. impressa* (form b) has been collected only in the Gulf of Mexico at depths where *P. wickstenae* co-occurs. At this point, we cannot conclusively rule out the possibilities that 'form b' individuals are the result of hybridization with *P. wickstenae*, or that *P. wickstenae* is in fact a blind morph of *P. impressa* form b.

In his original description of *P. impressa*, Harger did not fully illustrate the species, which shows considerable polymorphism hitherto unrecorded. We have documented two distinct morphs within the range of this polymorphism. Furthermore, this species grades almost imperceptibly into *P. wickstenae* of the Gulf of Mexico. Thus, for the sake of nomenclatural stability, we herein designate a lectotype for *P. impressa*.

Distribution. Politolana impressa has a broad Atlantic distribution, including the region south of Cape Hatteras, the mid-Atlantic sea board and the cold-temperate region north of Cape Cod, although it has been recorded only rarely from this latter area. In the region north of Cape Hatteras, *P. impressa*'s distribution overlaps with those of the three west Atlantic cold-temperate species, *P. polita*, *P. concharum* and *P. impostor*. *Politolana impressa* is the deepest dwelling western Atlantic *Politolana* species, found at depths from 73 m to 610 m, but most commonly at depths greater than 300 m. In addition to its broad Atlantic distribution, *P. impressa* is also found within the north-west Gulf of Mexico, at depths of about 500–700 m.

Redescription of P. wickstenae Wetzer et al., 1987

Type material examined. Series of specimens from Gulf of Mexico, col. by M.K. Wicksten, R/V Citation—LACM#3008: female holotype, 17 May 1985. LACM#3009: 28°22.89′N, 86°14′W, 488 m, 17 May 1985; 2 females, 1 gravid female (Paratypes). LACM#3010: May 1985; 2 females (Paratypes). LACM#3011: 28°22.89′N, 86°25.20′W, 500–600 m, June 1985; 4 females (Paratypes). LACM#3012: September 1986; 2 males, about 33 females (Paratypes). USNM#235303: 28°22′N, 86°25′W, 500–600 m, June 1986; 1 female (Paratype).

Type locality. Gulf of Mexico, 28°22.89′N, 86°14′W, 488 m.

Diagnosis. Body narrow and tubular, length 5–6 × width. Pereonal segments loosely articulated, pereon loosely articulated with and overlapping pleon. Cephalon subquadrate, slightly wider than long. Eyes absent or with remnant pigmented ommatidia.

Description of paratype (LACM#3012). Female, 29 mm long; body narrow with length about 5–6 × width. Pereonal segments loosely articulated; pereon cuticle highly polished; with scattered, darkly pigmented chromatophores on pereon, pleon and pleotelson.

Cephalon: subquadrate, slightly wider than long, lightly minutely punctate. Anterior margin medially concave or straight, without distinct rostral point, margins of raised frontal ridge extending laterally over region where eyes would be. Interocular furrow complete. Eyes absent or only with remnant pigmented ommatidia; cuticular ommatidial facets absent. Frontal lamina narrow, length about 3.1 × greatest width, with slight hourglass shape, reaching middle of antennule peduncles. Frontal lamina and clypeus with lateral margins raised as thickened ridges.

Antennule: Peduncle article 2 posterior distal angle with 1–2 short palmate setae. Flagellum composed of 11 articles, each with 4–7 long aesthetascs; first flagellar article longest, with length subequal to width; width of subsequent articles about twice length. In dorsal aspect, antennule peduncles proximally separated with frontal lamina usually visible between them.

Antenna: Reaching middle of second pereonite; peduncle articles 3–5 progressively longer; article 3 length subequal to width, widening slightly distally; article 4 longer than wide, subquadrate, posterior distal angle bearing about three long stiff simple setae; article 5 approximately 2.5× longer than wide, with width about half the basal width of article 4, posterior distal angle bearing one long stiff simple seta and about four short circumplumose setae. Flagellum composed of 22 articles.

Mandible: Molar process dorsal surface with fine setae, concentrated in distinct patch on distal posterior margin; anterior margin with spines widely spaced, not touching at their bases; molar process submarginal setal row with long lightly plumose setae extending from proximal cluster.

Maxilliped: Endite with distal cluster of approximately three robust circumplumose setae; right and left endites with two coupling hooks.

Pereon: Body long and narrow. Medially, pereonite 2 shorter than pereonite 1, pereonites 3–7 subequal in length, 5–7 slightly longer; in dorsal aspect pereonite 1 narrows slightly anteriorly, encompassing cephalon; with distinct impression along lateral margin, anterolateral margins straight forming blunt anterior angle. Coxae narrow; coxae 2 and 3 with impression parallel to lateral margin; coxae 4–6 narrow, with faint oblique impressions, impressions residual on coxae 6, posterior margins rounded forming blunt angles; coxae 7 extended past posterior margin of pereonite 7, posterior angle slightly acute, with or without residual oblique impressions, length subequal to length of coxae 6.

Pleon: First pleonite completely and loosely overlapped by pereonite 7; pleon cuticle less polished than pereon cuticle; dorso-ventrally narrower than pereon. Pleonites 1–4 with epimeres that are produced posteriorly and flared laterally; epimeres 2–4 bearing dense lateral setal fringe, 2 and 3 with faint notch in posterior margin. Ventral flanges visible, not hidden by dorsal epimeres, with ventral posterior angles rounded.

Pereopods 1–3: Ischium superior distal angle produced into large scoop-shaped lobe; posterior face of ischium with 2–3 oblique rows of simple setae. Merus with superior distal angle produced into large recurved lobe

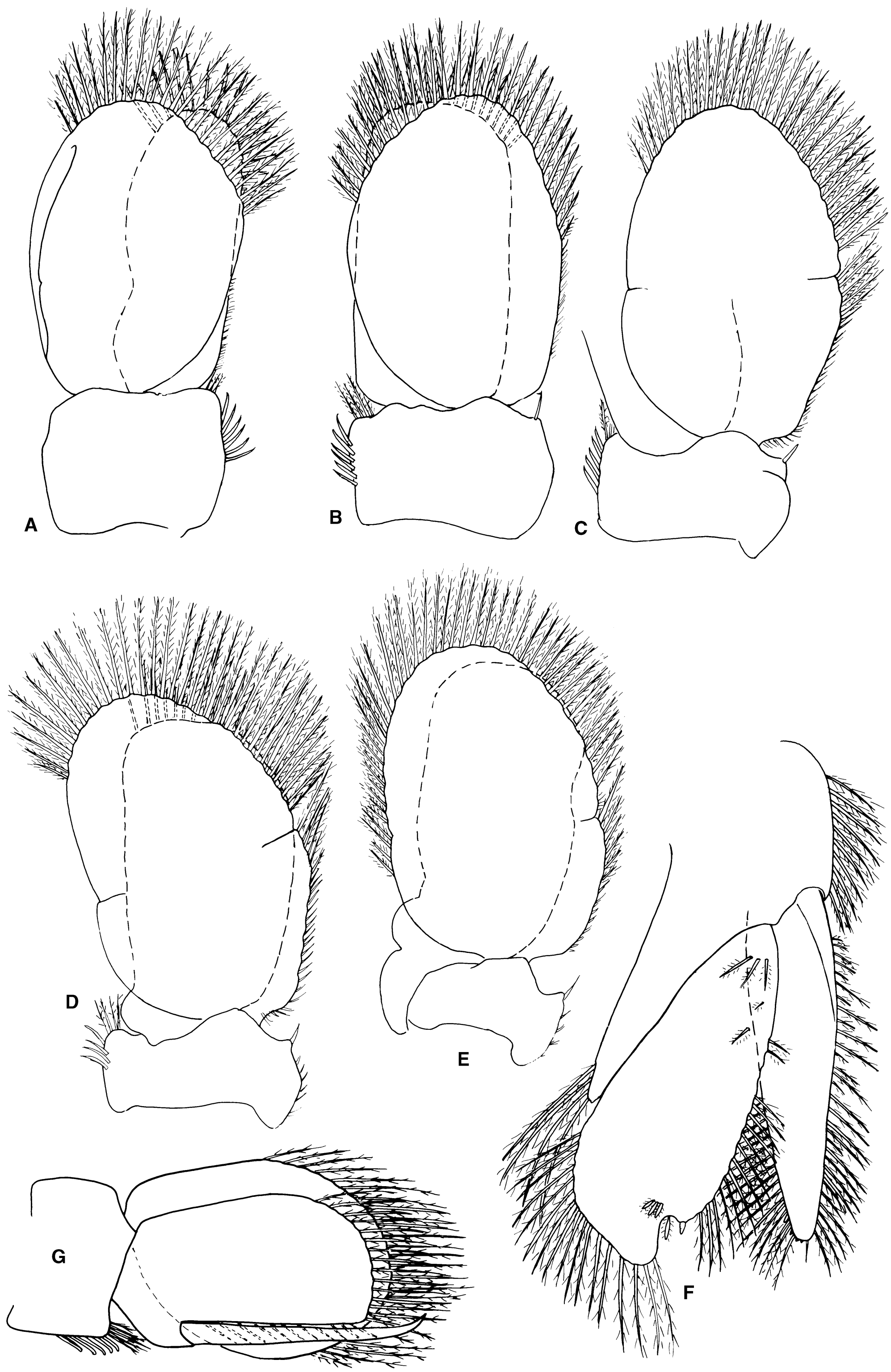

Figure 49. *Politolana impressa* female lectotype: (A–E) pleopods 1–5, respectively; (F) right uropod. *Politolana impressa* male: (G) pleopod 2.

reaching midpoint of propodus, with one (P1) or two (P2 and P3) giant apical setae; inferior margin of merus with row of long acute robust setae and row of adjacent short acute robust setae. Ischial and meral lobes of pereopods 1–3 progressively less produced. Carpus of P3 subquadrate. Distal superior margin of propodus with short row of simple setae.

Pereopods 4–6: Ischium superior margin with sparse simple setae; distal margin of ischium with studded-biserrate setae (absent on P4). Merus and carpus with robust setae arranged in transverse rows extending from inferior margin, progressively less setose on P5–P7. Carpus longer than wide. Pereopod 6 with distal angles of merus and carpus bearing long distally biserrate setae. Propodus without simple setae on superior margin; P6 propodus inferior margin with short acute distally biserrate setae and a robust studded-serrate seta on inferior distal angle.

Pereopod 7: Subequal in length to P6. Like P6 except: ischium width less than meral width; superior distal angle of merus with dense long slender plumose setae, long slender distally biserrate setae, and short acute robust setae; carpus distal margin expanded, about twice as wide as proximal propodal width.

Pleopods: Pleopod 1 peduncle subquadrate, or with length only slightly less than width, with six plumose coupling hooks; endopod width about one-half of exopod width. Peduncle of pleopods 2 and 3 with five plumose coupling hooks. Pleopod 4 with four coupling hooks.

Uropod: Peduncle medial production distally acute, with seven long plumose setae. Endopod apex truncate, with 3–4 small robust setae, PMS, and apical cluster of short simple setae. Exopod shorter than endopod, not reaching endopodal notch, peltate: broad and flat, with lateral margins convex; apex, distal medial and lateral margins with small robust setae.

Pleotelson: Posterior margin narrowly convex or subacute, with PMS, without apparent robust setae.

Sexual dimorphism. Wetzer et al. (1987) remarked on the near absence of males in the collections of *P. wickstenae* and the small size of the only two males collected. They illustrate a long, narrow, evenly tapering appendix masculina, reaching slightly beyond the pleopod rami.

Variation. The absence of eyes in this species varies from no visible signs of ommatidia to the presence of a few darkly pigmented remnant ommatidia. The distal patch of setae on the mandible molar process is not always distinct. Setation is more dense in larger individuals.

Remarks. This species is so similar to *P. impressa* that we question its status as a distinct species. None of the diagnostic characters given by Wetzer et al. (1987) are unique to this species: the short ovate uropod exopod is identical to that of *P. impressa*, and a variation in the length of this ramus is seen in both species; the slender appendix masculina is typical of most *Politolana* species; the compact coxae and the shape of the pleotelson margin are similar to those of *P. impressa*. The only differences that we observe between *P. wickstenae* and *P. impressa* are: (1) the near absence of pigmented ommatidia in the eyes; (2) the 'loosely articulated' nature of the pereonal segments in the former; and (3) the presence of simple setae along the entire distal margin of the maxillipedal palp (ventral face). All existing *P. wickstenae* specimens were collected on the same expedition and show poor preservation. Without these distinctions no reliable characters separate the two species other than length–width ratio, which has been seen to vary within *P. impressa* as well as within another species, *P. eximia*.

While we question the status of *P. wickstenae* as a distinct species, we cannot at this point rule out the possibility that those *P. impressa* specimens with a body form similar to *P. wickstenae* are a result of hybridization between these two species. We thus leave *P. wickstenae* with valid species status, using the absence of eyes and 'loose' nature of the pereonal segments as key diagnostic characters. *Politolana wickstenae* also differs subtly from *P. impressa* in the following ways: the coxae appear smaller in relation to the pereonites; the pereon overlaps pleon less markedly; the cephalon is longer in relation both to its width and to the length of the first pereonite; in dorsal aspect, the antennules are more distinctly separated and the frontal lamina is usually visible between them. However, within both species these additional characters show enough variation that they cannot be easily quantified or considered reliably diagnostic. Additional collections or molecular work will be necessary to determine the actual status of, and relationship between *P. wickstenae* and *P. impressa*.

Distribution. Known only from the Gulf of Mexico: 28°N, 86°W, at depths of 488–600 m. *Politolana* wickstenae appears to be syntopic with *P. impressa*, collected from the same general localities and from the same depth range.

BIOGEOGRAPHY

Full descriptions of each species' distribution are provided in the taxonomic section. Despite the relatively small size of the genus, *Politolana* exhibits a diverse range of biogeographical patterns. Below we examine the distribution of this genus in light of its phylogeny and review existing hypotheses regarding some of the common biogeographical patterns.

The cladistic analysis reveals that three species, *P. crosnieri*, *P. obtusispina* and *P. dasyprion*, are phy-

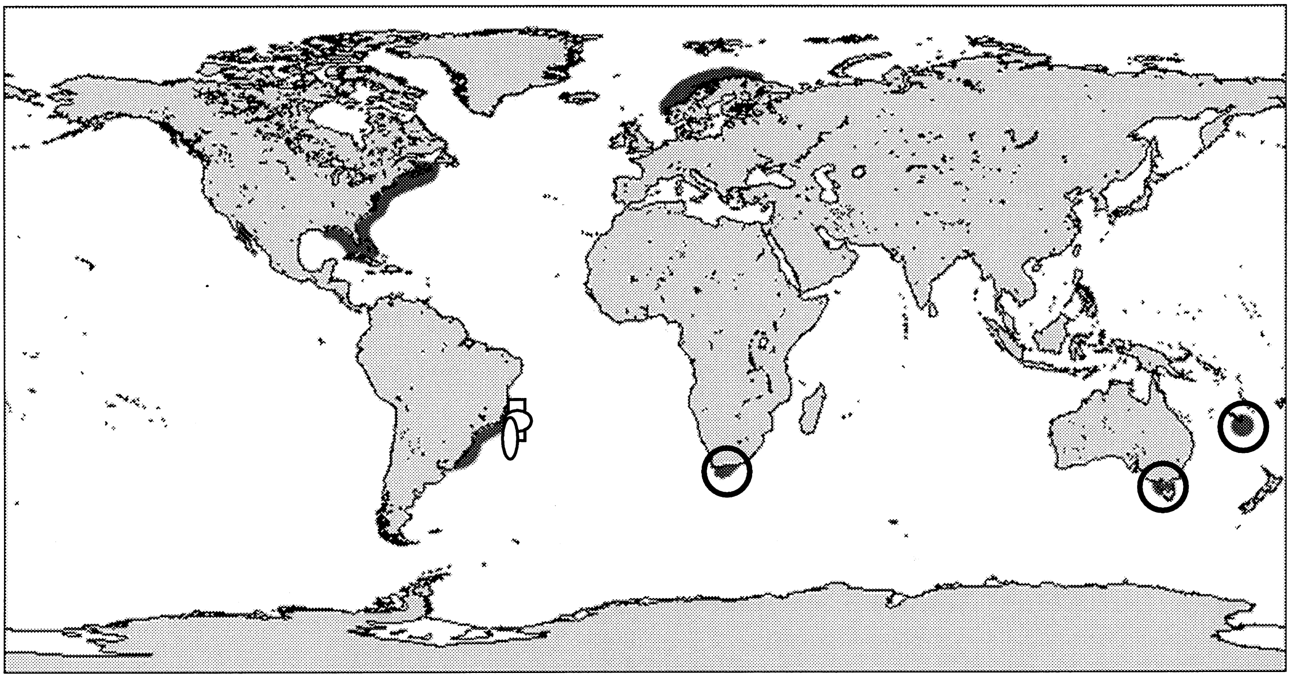

Figure 50. General distribution of *Politolana*. Circles indicate localities where the three phylogenetic outliers are found.

logenetic outliers. As can be seen in Fig. 50, these phylogenetic outliers are also geographical outliers, occurring in the south Pacific (*P. crosnieri* and *P. dasyprion*) and South Africa (*P. obtusispina*). With the removal of these three species from the genus, *Politolana* is restricted to the Atlantic, the Gulf of Mexico and the Gulf of California. Figure 51 is a taxon-area cladogram based on the *Politolana* phylogeny. Several biogeographical patterns in the distribution of this genus are presented graphically on the phylogeny in Fig. 51 for reference in the following discussion.

North–South Split of Two Politolana Lineages

The two main clades of *Politolana* have distinct distributions that generally correspond to a north–south split. The 'northern clade' includes species with a north Atlantic cold-temperate/lower boreal distribution. The 'southern clade' includes species of a more southern warm-temperate/subtropical distribution. These two clades overlap within the mid-Atlantic seaboard where both cold-temperate and warm-temperate faunas are known to occur.

Antitropical Distribution Within the Warm-Temperate/Subtropical Clade

Within the southern clade, the Brazilian sister group is most closely related to *P. impressa*/*P. wickstenae* in the northern hemisphere. Both the northern hemisphere lineage and the southern hemisphere lineage have distributions that border on the tropics, but there is a distinct absence of these or any other *Politolana* species from the tropics proper. Such antitropical relationships have been documented for a diversity of taxa and a good deal of literature addresses this type of distribution (Hubbs, 1952; Ekman, 1953; White, 1986; Briggs, 1987; Lindberg, 1991; Vermeij, 1992; Crame, 1993; Stepian & Rosenblatt, 1996). Aside from hypotheses of competitive exclusion or taxonomic replacement (Briggs, 1987), most explanations, both vicariant and dispersal in nature, suggest that the tropics has acted as a thermal barrier to temperate antitropically distributed taxa. Crame (1993), in a comprehensive review of research on bipolar distributions, cites evidence that supports several major timings for the formation of these distributions and concludes that 'bipolarity is a recurrent phenomenon through geological time'. Therefore it is difficult to propose a time for the cladogenic event at this node of the *Politolana* phylogeny, but it was almost assuredly associated with a tropical high temperature barrier. *Politolana* are found in deeper waters closer to the tropics, suggesting that latitudinal submergence may be occurring; however, distinguishing between jump dispersal or range expansion (i.e. dispersion *sensu*, Ball, 1983) across the tropics, or an ancient vicariant division of a broad distribution, is not possible at this time.

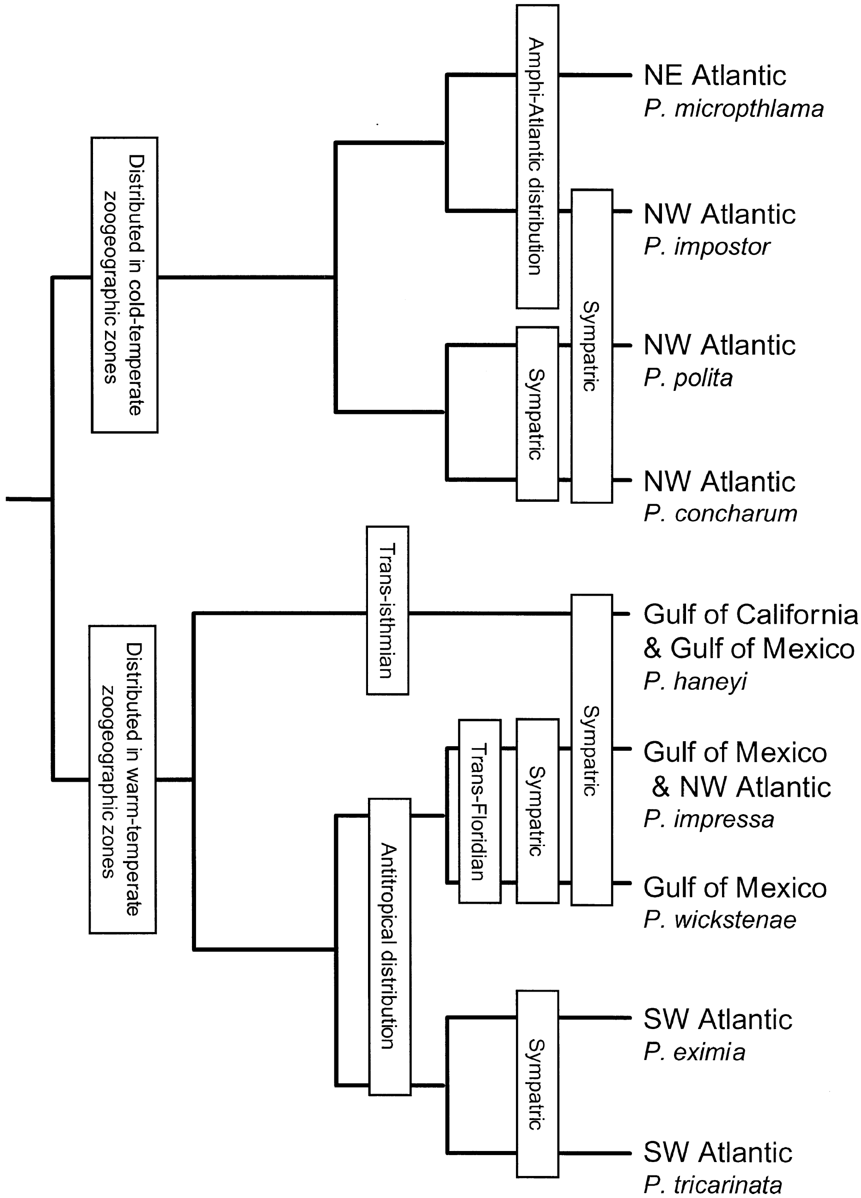

Figure 51. Taxon-area cladogram based on *Politolana sensu stricto* portion of the strict consensus tree with the various biogeographical phenomenon discussed in the text shown on the appropriate clades.

Amphi-Atlantic Clade

A link between the north-west and north-east Atlantic boreal regions is made by the sister species *P. impostor* and *P. micropthalma* (the only east Atlantic species in the genus). It is unlikely that *P. micropthalma* is more closely related to an undiscovered European species of *Politolana* because the fauna of that region is among the most well known in the world (Ekman, 1953). Therefore it is likely that this relationship does not represent poor taxon sampling, but a valid phylogenetic and biogeographical relationship. The cladogenic process that gave rise to these two species could have been the result of either dispersal across the North Atlantic or the vicariant opening of the north Atlantic, beginning as early as the mid-Cretaceous and ending with the separation of Greenland and Europe in the Miocene (Tarling, 1986; Smith *et al.*, 1994). The absence of *Politolana* species in the east Atlantic, with the exception of this taxon, suggests that the genus evolved subsequent to the opening of the north Atlantic and is younger than the Cretaceous. The phylogeny indicates that the ancestor of this clade was in the western Atlantic, and therefore if dispersal occurred (our favoured hypothesis) it would have been from the west Atlantic to the east Atlantic. Although isopods are not good dispersers, the west–east direction does correspond with the prevailing currents and rafting on debris or another organism such as fish cannot be ruled out. In addition, members of the genus *Politolana* are probably some of the best swimmers among the Isopoda.

Disjunct trans-Floridian Distribution

While most of the species distributions correspond to long-recognized faunal provinces, two have broad or unusual distributions. *Politolana impressa* is one of the most wide-ranging species in the genus, with a broad Atlantic distribution from Florida to Canada and a disjunct Gulf of Mexico population. We did not observe any morphological differentiation between populations in the different regions, but the degree of genetic differentiation awaits investigation. Significant genetic divergence between Gulf and Atlantic populations has been demonstrated for many species, often without accompanying distinguishing morphological features (Staton & Felder, 1995). Tam *et al.* (1996) found that within a species of mole crab (*Emerita talpoida*) with a range similar to that of *P. impressa*, genetic populations in Massachusetts and in South Carolina were nearly identical, while these Atlantic populations diverged significantly from a population in the northern Gulf of Mexico. Historical explanations for *trans*-Floridian distributions have typically been associated with environmental changes during recent glacial cycles (Felder & Staton, 1994), but much earlier Miocene or Pliocene disjunctions associated with the emergence of the Florida peninsula have also been proposed (McCommas, 1982; Bert, 1986).

Amphi-American Distribution

Politolana haneyi, another of the Carolinian species, has an unusual distribution including disjunct localities in the subtropical regions of the Gulf of California and northern Gulf of Mexico. The Atlantic and Pacific forms of *P. haneyi* are morphologically indistinguishable and we consider them a single species. Amphi-American distributions are not uncommon among isopods, with at least 15 species of isopods having such distributions. The formation of the Isthmus of Panama occurred slowly over 15 million years, with various connections between the eastern Pacific and Caribbean remaining until the final and complete closure 3.1–3.5 Ma (Jackson & Budd, 1996). Recent work suggests that isolation of different *trans*-isthmian geminate species was staggered over millions of years, with differences in divergence correlated to depth and sensitivity to sedimentation (Knowlton *et al.*, 1993). Therefore the Atlantic and Pacific populations of *P. haneyi* have been isolated for *at least* 3.1 million years. However, isolation may have occurred much earlier than the final closure of the seaway. This species must be evolving slowly or have a highly conserved morphology for the two populations to have been effectively isolated for this period of time and not exhibit any morphological differences.

Sympatry Among *Politolana* Species

A dominant pattern in the distribution of *Politolana* species is sympatry, especially among sister species. All terminal couplets in the phylogeny, with the exception of the northern amphi-Atlantic couplet, contain sister species that occur sympatrically in at least a portion of their ranges. Despite the large amount of sympatry, few samples include more than one species. Much of the material used for this study was collected by Bureau of Land Management-funded investigations during a 1976–77 survey of the eastern United States continental shelf and slope. Sample sites on Georges Bank at the same depth and in relatively close proximity yielded the same species at different sampling times throughout the year, suggesting that these species are sorting themselves. In general, sibling species have been found to have different and distinct preferences for substrate, salinity, exposure, hosts, etc. (Knowlton, 1993; Staton & Felder, 1995). While such distinctions probably exist between sympatric *Politolana* species, they are not evident from the available data.

The variety of distributional patterns in this genus, summarized in Fig. 51, is intriguing. The latitudinal distinction of the two main clades, the absence of species in the tropics, the slight to marked depth segregation of sympatric species, and the evidence of latitudinal submergence in at least one species (*P. concharum*) all indicate that temperature has been, and may continue to be, an important delimiting factor of this genus. While ecological factors influence distribution they do not suffice as historical explanations of distributional origins (Ball, 1975; Harold, 1998). Climatic/oceanographic events may have been important historical factors in the evolution of this genus. The recurrent pattern of sympatry and partial depth segregation of sister species suggests that a single event, or several similar events, led to speciation at these terminal nodes in the phylogeny with subsequent range expansion establishing modern patterns of sympatry. Perhaps during the numerous climatic cycles of the Neogene there were various episodes of species dispersal (range extension), vicariance and speciation. If mid-Miocene warming of the tropics was involved in the formation of the antitropical lineages and acted as the vicariant event hypothesized by White (1986), then more recent events, such as sea level, temperature and habitat changes during the recent Plio-Pleistocene climate cycles, may have been involved in the speciation and distribution patterns of the terminal sympatric couplets, and the *trans*-Floridian distribution of *P. impressa*.

ACKNOWLEDGEMENTS

Illustrations were drafted by Chip Griffin and by the first author. Rachel Taylor inked all illustrations. The following people provided assistance with locating and borrowing museum specimens and their help is greatly appreciated: Marilyn Schotte (USNM), Ardis Johnston (MCZ), Elycia Wallis (MVic), Danielle Defaye (MNDN), Meg O'Connell (GCRL), George Davis (LACM), Michelle van der Merwe (SAfM), Niel Bruce (ZMUC), A. Wilhelmsen (ZM), P. Young (NMB), A.M. Pires (University de São Paulo), D. Jones (University of Wales), Les Watling (U. Maine). Brian Kensley (USNM), Steve Keable (AM) and Niel Bruce generously provided advise on aspects cirolanid taxonomy. The second author is especially grateful to Niel Bruce for the many days spent agonizing over cirolanid specimens together in Copenhagen and Charleston. The authors would like to thank the anonymous reviewers for their careful consideration of the manuscript and for their helpful suggestions. Funding for this work was provided by an NSF PEET Grant to RCB (DEB-9896145). This work was submitted as partial fulfillment of a Master of Science degree by the first author.

REFERENCES

Ball IR. 1975. Nature and the formulation of biogeographical hypotheses. *Systematic Zoology* **24:** 407–430.

Ball IR. 1983. Planarians, plurality and biogeographical explanations. In: Sims RW, Price JH, Whalley PES, eds. *Systematic Association Special Volume no. 23, Evolution in Time and Space: The Emergence of the Biosphere.* London and New York: Academic Press, 409–430.

Bert TM. 1986. Speciation in Western Atlantic stone crabs (genus *Menippe*): the role of geological processes and climatic events in the formation and distribution of species. *Marine Biology* **93:** 157–170.

Biernbaum CK, Wenner E. 1993. Trapping of necrophagous crustaceans on the upper continental slope off South Carolina, U.S.A. *Journal of Crustacean Biology* **13** (3)**:** 601–608.

Botosaneanu L, Bruce NL, Notenboom J. 1986. Cirolanidae. In: Botosaneanu L, ed. *Stygofauna Mundi*. Leiden: E. J. Brill/Dr. W. Backhyus, 412–422.

Bremer K. 1994. Branch support and tree stability. *Cladistics* **10:** 295–304.

Briggs JC. 1987. Antitropical distribution and evolution in the Indo-West Pacific Ocean. *Systematic Zoology* **36** (3)**:** 237–247.

Bruce NL. 1981a. Cirolanidae (Crustacea: Isopoda) of Australia: Diagnoses of *Cirolana* Leach, *Metacirolana* Nierstrasz, *Neocirolana* Hale, *Anopsilana* Paulian & Deboutteville, and three new genera – *Natatolana*, *Politolana,* and *Cartetolana*. *Journal of Marine and Freshwater Research* **32:** 945–966.

Bruce NL. 1981b. The Cirolanidae (Crustacea: Isopoda) of Australia: new species and a new genus from southeastern Australia. *Records of the Australian Museum* **33** (13)**:** 644–672.

Bruce NL. 1986. Cirolanidae (Crustacea: Isopoda) of Australia. *Records of the Australian Museum Supplement* **6:** 1–239.

Bruce NL. 1991. New records of marine isopod crustaceans (Sphaeromatidae, Cirolanidae) from south-eastern Australia. *Memoirs of the Museum of Victoria* **52** (2)**:** 263–275.

Bruce NL. 1996. Crustacea Isopoda: some Cirolanidae from the Musorstom cruises off New Caledonia. In: Crosnier A, ed. *Résultats Des Campagnes MUSORSTOM*, 15. Paris: Mémoires du Muséum National d'Histoire Naturelle, **168:** 147–166.

Brusca RC, Brusca GJ. 1990. *Invertebrates* Sinauer Associates, Sunderland, MA.

Brusca RC, Iverson EW. 1985. A guide to the marine isopod Crustacea of Pacific Costa Rica. *Revista Biologia Tropical* **33** (suppl. 1)**:** 1–77.

Brusca RC, Wilson GDF. 1991. A phylogenetic analysis of the Isopoda with some classificatory recommendations. *Memoirs of the Queensland Museum* **31:** 143–204.

Brusca RC, Wetzer R, France S. 1995. Cirolanidae (Crustacea: Isopoda: Flabellifera) of the tropical Eastern Pacific. *Proceedings of the San Diego Society of Natural History* **30:** 1–96.

Crame JA. 1993. Bipolar molluscs and their implications. *Journal of Biogeography* **20:** 145–161.

Dana JD. 1853. *Crustacea, Part II. United States Exploring Expedition during the years 1838, 1839, 1840, 1841, 1842, under the command of Charles Wilkes, U.S.N.* Philadelphia: C. Sherman, **14:** 689–1618.

Dollfus A. 1903. Note preliminaire sur les especes du genre Cirolana recueillis pendent le campagnes de l'Hirondelle et de la Princess Alice sous la direction de S.A.S. le Prince Albert 1er de Monaco. *Bulletin de la Societe Zoologique de France* **28:** 5–10.

Ekman S. 1953. *Zoogeography of the Sea*. London: Sidgewick and Jackson.

Felder DL, Staton JL. 1994. Genetic differentiation in trans-Floridian species complexes of *Sesarma* and *Uca* (Decapoda: Brachyura). *Journal of Crustacean Biology* **14** (2)**:** 191–209.

Hansen HJ. 1890. Cirolanidæ et familiæ nonnullæ propinquæ Musei Hauniensis. *Det Kongelige Danske Videnskabernes Selskab Skrifter, Naturvidenskabelig Og Mathematissk* **6** (3)**:** 237–426.

Hansen HJ. 1905. Revision of the European forms of the Cirolaninae, a subfamily of Crustacea, Isopoda. *Journal of the Linnean Society, Zoology* **29:** 337–373.

Harger O. 1874. In: Verrill AE, Smith SI, Harger O, eds. *Catalogue of the Marine Invertebrate Animals of the Southern Coast of New England, and Adjacent Waters*. Washington, DC: Government Printing Office, 1–478.

Harger O. 1879. Notes on New England Isopoda. *Proceedings of the United States National Museum*, **2:** 157–165.

Harger O. 1883. Reports on the results of dredging, under the supervision of Alexander Agassiz, on the east coast of the United States, during the summer of 1880, by the U.S. Coast Survey Steamer 'Blake', Commander J. R. Bartlett, U.S.N., commanding. *Bulletin of the Museum of Comparative Zoology at Harvard College* **11** (4)**:** 91–104.

Harger O. 1880. Report on the marine Isopoda of New England and adjacent waters. *Report of the Commission for 1878, U.S. Commission of Fish and Fisheries* **Part 6** (Appendix E): 297–462.

Harold AS. 1998. Areas of endemism and historical inference in biogeography. *IOC Workshop Report* **142:** 142–148.

Hoek PPC. 1882. Die Crustaceen gesammelt wahrend der Fahrten des 'Willem Barents'. *Niederlandisches Archiv Fuer Zoologie Supplement* **1** (3)**:** 1–75.

Hubbs CL. 1952. Antitropical distribution of fishes and other organisms. *Proceedings of the 7th Pacific Science Congress* **3:** 324–330.

International Commission on Zoological Nomenclature. 1999. *International Code of Zoological Nomenclature*, 4th edn. London: International Trust for Zoological Nomenclature.

Jackson JBC, Budd AF. 1996. Evolution and environment: introduction and overview. In: Jackson JBC, Budd AF, Coates AG, eds. *Evolution and Environment in Tropical America*. Chicago and London: The University of Chicago Press.

Jones DA. 1979. *Cirolana micropthalma* Hoek, 1882 (Isopoda, Cirolanidae) from the North Sea. *Crustaceana* **37** (3)**:** 318–320.

Keable SJ. 1997. The Cirolanidae (Crustacea: Isopoda) of Darwin Harbour, Northern Territory, with additional records from northern Australia and Papua New Guinea. In: Hanley JR, Caswell G, Megirian D, Larson HK, eds. *Proceedings of the Sixth International Marine Biological Workshop. The Marine Flora and Fauna of Darwin Harbour, Northern Territory, Australia.* Darwin, Australia: Museums and Art Galleries of the Northern Territory and the Australian Marine Sciences Association, 245–278.

Kensley B. 1975. Marine Isopoda from the continental shelf of South Africa. *Annals of the South African Museum* **67** (4)**:** 35–89.

Kensley B, Schotte M. 1989. *Guide to the Marine Isopod Crustaceans of the Caribbean*. Washington DC: Smithsonian Institution Press.

Knowlton N. 1993. Sibling species in the sea. *Annual Review of Ecology and Systematics* **24:** 189–216.

Knowlton N, Weigt LA, Solórzano LA, Mills DK, Bermingham E. 1993. Divergence in proteins, mitochondrial DNA, and reproductive compatibility across the Isthmus of Panama. *Science* **260:** 1629–1632.

Kussakin OG. 1979. *Marine and Brackish-Water Isopoda of Cold and Temperate Waters of the Northern Hemishpere. Flabellifera.* Leningrad: Academy of Science. [In Russian.]

Latreille PA. 1817. Les Crustacés, les Arachnides, et les Insectes. In: Cuvier GLCFD, ed. *Le Regne Animal, distribué d'après son organisation, pour servir de base à l'histoire naturalle des animaux et d'introduction à l'anatomie comparée*, Vol. 3. Paris.

Leach WE. 1818. Cymothoadees. In: Cuvier F, ed. *Dictionnaire Des Sciences Naturelles*, 12. Paris.

Lindberg DR. 1991. Marine biotic interchange between the northern and southern hemisphere. *Paleobiology* **17** (3)**:** 308–324.

Luetken CF. 1859. Nogle bemaerkninger om de Nordiske Aega-arter samt om Aega-slaegtens rette Begraendsning. *Videnskabelige Meddelelser fra den naturhistoriske Forening i Kjobenhavn*, 65–78.

Maddison WP, Maddison DR. 1992. *MacClade: Analysis of Pylogeny and Character Evolution*, Version 3. Sunderland, MA: Sinauer Associates.

McCommas SA. 1982. Biochemical genetics of the Sea Anemone *Bunodosoma cavernata* and the zoogeography of the Gulf of Mexico. *Marine Biology* **68:** 169–173.

Menzies RJ, Frankenberg DF. 1966. *Handbook on the Common Marine Isopod Crustacea of Georgia*. Athens, Georgia: University of Georgia Press.

Monod T. 1930. Notes isopodologiques. III. – sur un Cassidinopsis peu connu des iles Kerguelen. *Bulletin de la Societe Zoologique de France* **55:** 437.

Monod T. 1971a. Sur deux isopodes marins du Golfe de Kutch (Inde). *Bulletin Du Museum National d'Histoire Naturelle, Paris* (2) **42** (5)**:** 944–956.

Monod T. 1972. Contribution a l'etude de la grotte de Sof Omar (Ethiopie Meridionale), 3 – Sur une espece nouvelle de Cirolanide cavernicole, *Skotobaena mortoni* (Crust., Isopoda). *Annales de Speleologie* **27:** 205–220.

Moore RC, ed. **1953.** *Treatise on Invertebrate Paleontology, Part R, Arthropoda 4*. New York: Geological Society of America, prepared under the Guidance of the Joint Committee on Invertebrate Paleontology.

Paul AZ, Menzies RJ. 1971. Sub-tidal isopods of the Fosa de Cariaco, Venezuela, with descriptions of two new genera and twelve new species. *Boletin de Instituto Universidade Oriente* **10** (1)**:** 29–48.

Rachlin JW, Warkentine BE. 1997. Comments on the population structure of the benthic marine isopod *Politolana concharum* collected by the Atlantic Sturgeon, *Acipenser oxyrhyncus*. *Crustaceanna* **70** (3)**:** 368–379.

Racovitza EG. 1912. Biospeleologica 27. Cirolanides (Premiere serie). *Archives de Zoologie Experimentale et Generale, Paris* **5** (10)**:** 203–329.

Richardson H. 1900. Synopses of North-American Invertebrates. VIII. The Isopoda. Part I. Chelifera, Flabellifera, Cirolanidae. *American Naturalist* **34:** 207–230.

Richardson H. 1901. Key to the isopods of the Atlantic coast of North America with descriptions of new and little known species. *Proceedings of the United States National Museum* **23:** 1–89.

Richardson H. 1905. A monograph on the isopods of North America. *Bulletin of the United States National Museum* **54:** i–liii, 1–727.

Richardson H. 1913. Crustaces Isopodes. *Deuxieme Expedition Antarctique Francaise (1908–1910)* **72:** 1–24.

Riseman SF, Pires AM, Brusca RC, 2001. A new species of *Politolana* Bruce 1981 (Isopoda: Flabellifera: Cirolanidae) from the south Brazilian shelf. In: Kensley B, Brusca RC, eds. *Isopods Systematics and Evolution*. Crustacean Issues 13, Balkema, Rotterdam.

Sars GO. 1872. Undersogelser over Hardangerfjordens Fauna. I. Crustacea. *Forhandlinger I Videnskaps-Selskabet I Christiania* **1871:** 246–286.

Sars GO. 1882. Oversigt af Norges Crustacea. *Forhandlinger I Videnskaps-Selskabet I Christiania* **18:** 1–124.

Sars GO. 1885. The Norwegian North Atlantic Expedition. 1876–1878, Zool. 6. *Forhandlinger i Videnskaps-selskabet i Christiania* 1–280.

Sars GO. 1899. *An Account of the Crustacea of Norway,* Vol. 2, Parts 13–14. Bergen: Isopoda, 1–270.

Schultz GA. 1969. *How to Know the Marine Isopod Crustaceans*. Dubuque, IA: Wm. C. Brown Company Publishers.

Smith AG, Smith DG, Funnell BM. 1994. *Atlas of Mesozoic and Cenozoic Coastlines*. Cambridge: Cambridge University Press.

Staton JL, Felder DL. 1995. Genetic variation in populations of the ghost shrimp genus *Callichirus* (Crustacea: Decapoda: Thalassinoidea) in the Western Atlantic and Gulf of Mexico. *Bulletin of Marine Science* **56:** 495–508.

Stebbing TRR. 1905. Report to the Government of Ceylon on the pearl oyster fisheries of the Gulf of Manaar. Report on the Isopoda collected by Professor Herdman, at Ceylon, in 1902. *Ceylon Pearl Oyster Fisheries, 1905, Supplementary Reports* **23:** 1–64.

Stepian CA, Rosenblatt RH. 1996. Genetic divergence in antitropical pelagic marine fishes (*Trachurus*, *Merluccius*, and *Scomber*) between North and South America. *Copea* **3:** 586–598.

Stimpson W. 1853. Synopsis of the marine Invertebrata of Grand Manan. *Smithsonian Contributions to Knowledge* **6:** 1–66.

Swofford. 1993. *PAUP: Phylogenetic Analysis Using Parsimony*, Version 3.1.1 Champaign, IL: Illinois Natural Historu Survey.

Tam YK, Kornfield I, Ojeda FD. 1996. Divergence and zoogeography of mole crabs, *Emerita* spp. (Decapoda: Hippidae), in the Americas. *Marine Biology* **125** (3)**:** 489–497.

Tarling DH. 1986. *Continetal Drift and Biological Evolution*. Burlington, NC: Carolina Biological Supply Company.

Vermeij GJ. 1992. Trans-equatorial connections between biotas in the temperate Eastern Atlantic. *Marine Biology* **112:** 343–348.

Verrill AE. 1873. Results of recent dredging expeditions on the coast of New England. *American Journal of Science and Arts, Third Series* **5** (25)**:** 1–16.

Verrill AE. 1874a. Results of recent dredging expeditions on the Coast of New England, 6. *American Journal of Arts and Sciences* **III** (3)**:** 405–414.

Verrill AE. 1874b. Report upon the invertebrate animals of Vineyard Sound and adjacent waters, with an account of the physical features of the region. *Report of the Commission of Fish and Fisheries,* **Part 1:** 459(165).

Verrill AE. 1885. Results of the explorations made by the steamer Albatross off the northern coast of the United States in 1883. Report U.S. Commissioner of Fish and Fisheries. Washington DC: Government Printing Office.

Watling L. 1989. A classification system for crustacean setae based on the homology concept. In: Felgenhaur BE, Watling L, Thistle AB, eds. *Functional Morphology of Feeding and Grooming in Crustacea*. Rotterdam: AA. Balkema, 15–26.

Watling L, Lindsay J, Smith R, Mauner D. 1974. The distribution of Isopoda in the Delaware Bay region. *Internationale Revue der Gesamten Hydrobiologie* **59** (3)**:** 343–351.

Wetzer R, Delaney PM, Brusca RC. 1987. *Politolana wickstenae* new species, a new cirolanid isopod from the Gulf of Mexico, and a review of the 'Conilera genus-group' of Bruce (1986). *Contributions in Science*. Natural History Museum of Los Angeles County, No. 392: 1–10.

White BN. 1986. The isthmian link, antitropicality and American biogeography: distributional history of the Atherinopsinae (Pisces: Antherinidae). *Systematic Zoology* **35** (2)**:** 176–194.

APPENDIX 1. CHARACTERS USED IN CLADISTIC ANALYSIS

Note: An annotated character list, with descriptive information, is available from the authors.

1. Cephalon frontal margin:
   [0] medially convex
   [1] medially concave or flattened
   [2] subquadrate <out-group state>
2. Lateral margins of raised frontal ridge:
   [0] reaching, but not dividing the eyes
   [1] dividing the eyes
3. Cephalon interocular furrow:
   [0] absent
   [1] present, incomplete medially
   [2] present and complete
4. Cephalon:
   [0] without secondary cuticular ridge between frontal ridge and interocular furrow
   [1] with secondary cuticular ridge between frontal ridge and interocular furrow
5. Ventral margin of the eyes:
   [0] without fringe of simple setae
   [1] with fringe of simple setae
6. Frontal lamina:
   [0] reduced
   [1] narrow with slight hourglass shape
   [2] narrow and anteriorly widened, spatulate

[3] pentagonal, anteriorly rounded
[4] pentagonal, anteriorly acute
[5] small and triangular <out-group state>
[6] narrowing anteriorly, posterior margin ventrally projecting <out-group state>

7. Antennule flagellum length:
[0] subequal to peduncle length
[1] much longer than peduncle length, reaching pereonite 5
[2] shorter than peduncle length
8. Antennule peduncle article 2:
[0] wider than long
[1] at least twice as long as wide
[2] with length subequal to width
9. Antennule peduncle cuticle:
[0] without microscopic ovate macula
[1] with microscopic ovate macula
10. Antenna:
[0] reaching posterior margin of cephalon
[1] reaching middle of pereonite 1; never reaching pereonite 2
[2] reaching posterior region of pereonite 1 to the middle of pereonite 2
[3] reaching pereonite 6
[4] reaching pereonites 3 or 4 <out-group state>
11. Antenna peduncle:
[0] articles 3–5 subequal in length
[1] articles 3–5 progressively longer
[2] articles 3 and 4 subequal in length, 5 longest
[3] article 3 longest, 4 and 5 subequal in length <out-group state>
12. Antenna peduncle article 4:
[0] with length subequal to, or less than width
[1] longer than wide
13. Antenna peduncle article 4 posterior distal angle:
[0] with 10 or less long stiff simple setae
[1] with dense cluster about 15–20 long stiff simple setae
[2] with row of long biplumose setae <out-group state>
14. Antenna flagellum:
[0] composed of 8–16 articles
[1] composed of 20–30 articles
15. Mandible molar process with spines on anterior margin:
[0] widely spaced, not touching at their bases
[1] closely spaced, touching at their bases
16. Mandible molar process:
[0] without submarginal row of long plumose setae
[1] with submarginal row of long, lightly plumose setae extending from proximal join toward the apex of the molar process
17. Mandible molar process:
[0] without fine setae on dorsal surface, or only with sparse fine setae confined to distal posterior margin <out-group state>
[1] with fine setae covering dorsal surface and posterior margin, without a distinct patch of setae on the distal posterior margin
[2] with fine setae on dorsal surface as well as a distinct patch of setae on the distal posterior margin
18. Maxilliped endite:
[0] with distal cluster of approximately three robust circumplumose setae
[1] with distal cluster of approximately 6–8 robust circumplumose setae
19. Maxilliped basis distolateral angle:
[0] without row or cluster of long simple setae
[1] with row or cluster of long simple setae
[2] with single slender plumose seta <out-group state>
20. Maxilliped ventral face of palp article 2:
[0] with lateral half of distal margin bare, with or without simple setae along medial half of distal margin, sometimes in an oblique row
[1] with simple setae along entire distal margin; on medial half, setae may be organized into oblique rows
21. Pereon cuticle:
[0] highly polished and porcellanate
[1] papery or not highly polished
22. Dorsal surface of pereonites:
[0] without transverse ridge in the cuticle
[1] with transverse ridge in the cuticle
23. Pereonite 1 anterolateral margins:
[0] straight, forming rounded or blunt anterior angles
[1] sinuate, forming acute anterior points
24. Pereonite 7:
[0] overlapping only the anterior portion of the first pleonite
[1] completely overlapping at least the first and most of the second pleonites
25. Coxal oblique impressions:
[0] absent on coxae 4–6
[1] present on coxae 4–6
26. Coxal oblique impressions:
[0] absent or residual (marked by puctations) on coxae 7
[1] distinct on coxae 7
27. Ventral margins of coxal plates:
[0] without setae
[1] with fringe of sparse simple setae <out-group state>
28. Posterior margins of coxae 2 and 3:
[0] rounded
[1] with medial notch or indentation
29. Pereopod 1 ischium anterior face:
[0] without submarginal cluster of simple setae
[1] with submarginal cluster of simple setae
30. Pereopods 1 and 2 posterior face ischium:

[0] with one distinct oblique row of simple setae (may also have submarginal setae along distal margin, but these are not organized into an oblique row)
[1] with two or three distinct oblique rows of simple setae

31. Pereopods 4–6 ischium superior margin:
[0] without simple setae
[1] with simple setae
[2] with single long plumose seta <out-group state>

32. Pereopod 4 posterior face of ischium:
[0] without studded-biserrate setae on distal margin
[1] with studded-biserrate setae on distal margin

33. Pereopods 5–7 posterior face of ischium:
[0] without studded-biserrate setae on distal margin
[1] with studded-biserrate setae on distal margin

34. Pereopod 1 meral lobe:
[0] short, one-quarter the length of the article, reaching slightly beyond the base of the propodus
[1] half the length of entire merus, recurved, extending beyond midpoint of propodus

35. Pereopod 1 meral lobe:
[0] without giant apical setae
[1] with one giant apical seta
[2] with two giant apical setae

36. Pereopod 2 meral lobe:
[0] without giant apical setae <out-group state>
[1] with one giant apical seta
[2] with two giant apical setae

37. Pereopod 3 meral lobe:
[0] without giant apical setae <out-group state>
[1] with one giant apical seta
[2] with two giant apical setae

38. Pereopods 1–3 inferior margin of merus:
[0] with distally very blunt, flattened and textured setae
[1] with broad robust subacute setae
[2] with narrow robust acute setae
[3] with long acute, distally biserrate setae <out-group state>

39. Pereopods 4 and 5 merus and carpus posterior face:
[0] with many scattered short blunt robust setae (Pereopods 6 and 7 with setae less scattered and arranged into rows perpendicular to the inferior margin)
[1] with robust setae sparse and organized into rows perpendicular to and extending around inferior margin
[2] with distal lateral row of setae, but without setal rows on entire article <out-group state>
[3] with sparse scattered short robust setae

40. Pereopods 5 and 6:
[0] without cluster of 4–5 short stout studded-serrate robust setae on anterior distal margin of the merus and carpus
[1] with cluster of 4–5 short stout studded-serrate robust setae on anterior distal margin of the merus and carpus

41. Pereopod 3 carpus length:
[0] broad (rectangular)
[1] narrow (square)

42. Pereopods 1–3 superior margin of propodus:
[0] without simple setae
[1] with row of simple setae, set in groove

43. Pereopods 4–7 superior margin of propodus:
[0] without simple setae
[1] with sparse simple setae

44. Pereopod 6 propodus inferior margin:
[0] with simple or slender distally biserrate setae, without stout studded-serrate setae
[1] with stout robust studded-serrate setae

45. Inferior distal angle of propodus:
[0] without giant robust seta
[1] with giant robust seta <out-group state>

46. Pereopod dactyls:
[0] with small and blunt secondary ungui
[1] with long and narrow secondary ungui <out-group state>

47. Pereopod 3 dactyl length:
[0] less than propodal length
[1] subequal to propodal length or only slightly shorter

48. Pereopod 7 superior distal angle of merus:
[0] with long slender simple setae, long slender distally biserrate setae and short robust acute setae (without long slender plumose setae)
[1] with long slender plumose setae, long slender distally biserrate setae and short robust acute setae (without long slender simple setae)
[2] with both long slender simple and long slender plumose setae in addition to long slender distally biserrate setae, and short robust acute setae

49. Pereopod 7 carpus distal margin:
[0] expanded such that width is subequal to length, and at least 3× wider than proximal propodal width
[1] longer than wide, about twice as wide as proximal propodal width
[2] not expanded at all, only slightly wider than proximal propodal width <out-group state>

50. Pleon:
[0] more dorsoventrally compressed than pereon
[1] convex similar to pereon, not dorsoventrally compressed

51. Lateral fringe of plumose setae on pleonite epimeres 2–4:
[0] absent
[1] present

52. Epimeres of pleonites:
    [0] 1 and 4 only posteriorly produced
    [1] 1 through 4 posteriorly produced
    [2] only 3 and 4 posteriorly produced
    [3] 2 through 4 only weakly produced <out-group state>
53. Epimeres of pleonites:
    [0] not ventrally produced
    [1] 3 and 4 greatly produced ventrally
54. Pleonite ventral flanges, ventral posterior angle:
    [0] produced into a fine point
    [1] blunt or rounded
    [2] rounded except the second which is slightly pointed <out-group state>
55. Pleopod 1 endopod width:
    [0] about one-half or less than width of exopod
    [1] greater than half the width of exopod
56. Pleopod 2 appendix masculina:
    [0] narrow, more than 15× longer than wide (apices and form may differ)
    [1] broad, less than 10× longer than wide (apices and form may differ)
57. Uropod peduncle ventral distal lateral corner:
    [0] without acute robust seta
    [1] with acute robust seta

This large seta is often difficult to see as it is buried in the fringe of plumose setae curving from the lateral margin onto the distal ventral margin.

58. Uropod exopod:
    [0] rounded
    [1] flat
59. Uropod exopod:
    [0] shorter than endopod
    [1] longer than endopod and reaching beyond pleotelson apex
    [2] subequal in length to endopod and pleotelson apex (*P. dasyprion*)
60. Uropod endopod distal margin:
    [0] without robust setae
    [1] with robust setae of generally equal size
    [2] with robust setae, apical seta much larger than the others
61. Dorsal surface of pleotelson:
    [0] flat and unornamented
    [1] with two rounded longitudinal ridges
    [2] with slight longitudinal depression <out-group state>
    [3] convex, dome shaped <out-group state>

APPENDIX 2. MATRIX FOR CLADISTIC ANALYSIS: 61 CHARACTERS × 15 TAXA

Character#	1–10	11–20	21–30	31–40	41–50	51–61
Politolana polita	0020100010	0010011100	0000000000	0000112001	0101000011	10010000020
Politolana eximia	1120010002	1101011111	0011110011	1001122110	1101001100	11011101110
Politolana tricarinata	1121020001	(0,2)000011000	0001110001	11111(1,2)(1,2)(2,1)10	1101001100	11010101010
Politolana concharum	00(1,2)0010011	0010011100	0000000000	1000112000	0110000011	10000010020
Politolana micropthalma	1010010011	(0,2)000111100	0000000000	0000222130	0100000211	10010?01010
Politolana crosnieri	200004110?	??0?011000	0000111000	0001011010	1100100011	02010?01010
Politolana impressa	1120010002	1101012000	0001100001	1011122210	1101000110	11010001010
Politolana wickstenae	1120010002	1101012001	0001100001	1011122210	1101000110	11010001010
Politolana obtusispina	0020032201	1100001000	1101110000	01?0012010	1000000011	02000011011
Politolana impostor	1010020012	(0,2)000111110	0000000000	1000122100	0110000011	10000011010
Politolana dasyprion	20000122?1	0000?11000	1000110100	1000022010	1100010011	02110010211
Politolana haneyi	1120010002	110101(1,2)000	0000100001	1011122210	1101000111	10010001010
Conilera	1010020001	2000010000	0010110000	0000112010	1100000021	03011011000
Dolicholana	1000160204	2121012020	0000110010	2001000320	1000010021	02121011013
Orphelana	0?000520?1	3000100000	1100110000	00001?1000	110?011011	02110011012

APPENDIX 3. USNM LOTS CONTAINING SPECIMENS OF *P. HANEYI* OR *P. HANEYI*-LIKE MATERIAL FROM THE NORTH-WEST ATLANTIC

USNM#191870: off NJ, 38°44.12 N, 073°09.06 W, 116 m, col. by CABP/VIMS, sta. F2, 11 August 1977; 1 juv/manca. USNM#191787: off NJ, 39°07.30 N, 072°48.54 W, 93 m, col. by CABP/VIMS, sta. I2, 22 August 1976; 10+ spec. USNM#40852: off Portugal, 42°48.24 N, 011.57 30 W, 627 m, col. by Travailleur R/V, Paris Museum, sta. 16, 18 July 1882; 1 gravid female (this record is likely to be a cataloguing error). USNM#191743: off VA, 37°08.06 N, 074°37.00 W, 94 m, col. by CABP/VIMS, sta. L4, 22 March 1976; 1 spec. USNM#191778: off VA, 37°06.06 N, 074°33.12 W, 180–200 m, col. by CABP/VIMS, sta. L5, 1 September 1976; 1 manca. USNM#191839: off VA, 37°08.06 N, 074°36.54 W, 94 m, col. by CABP/VIMS, sta. L4, 13 March 1977; 1 spec. USNM#191831: off NJ, 39°14.30

N, 072°47.30 W, 91 m, col. by CABP/VIMS, sta. A1, 15 November 1976; 4 spec. USNM#191741: off DE, 38°04.30 N, 074°01.42 W, 105 m, col. by CABP/VIMS, sta. K4, 12 March 1976; 4 spec. USNM#191782: off DE, 38°04.36 N, 074°01.54 W, 102 m, col. by CABP/VIMS, sta. K4, 31 August 1976; 8 spec. USNM#191783: off DE, 38°04.36 N, 073°53.54 W, 140–150 m, col. by CABP/VIMS, sta. K5, 31 August 1976; 1 manca. USNM#191841: off DE, 38°04.36 N, 074°01.42 W, 103 m, col. by CABP/VIMS, sta. K4, 16 February 1977; 3 spec. USNM#191744: off NJ, 38°44.12 N, 073°09.06 W, 110 m, col. by CABP/VIMS, sta. F2, 18 March 1976; 5 spec. (possibly 1 *P. impostor* manca). USNM#191745: off NJ, 38°43.48 N, 073°04.18 W, 150 m, col. by CABP/VIMS, sta. F3, 18 March 1976; 2 spec. USNM#191756: off NJ, 39°22.12 N, 072°31.00 W, 127 m, col. by CABP/VIMS, sta. A2, 5 March 1976; 4 spec. USNM#191773: off NJ, 39°16.30 N, 072°29.54 W, 139 m, col. by CABP/VIMS, sta. A3, 22 June 1976; 1 spec. USNM#191786: off NJ, 39°06.36 N, 072°59.00 W, 77 m, col. by CABP/VIMS, sta. I1, 23 August 1976; 10+ spec. USNM#191844: off NJ, 39°06.36 N, 072°59.00 W, 77 m, col. by CABP/VIMS, sta. I1, 13 February 1977; 2 spec. USNM#191774: off NJ, 39°16.30 N, 072°29.54 W, 139 m, col. by CABP/VIMS, sta. A3, 22 June 1976; 1 spec. USNM#191845: off NJ, 39°07.30 N, 072°49.06 W, 93 m, col. by CABP/VIMS, sta. I2, 13 February 1977; 5 spec. USNM#191865: off NJ, 39°08.54 N, 072°41.54 W, 170 m, col. by CABP/VIMS, sta. I3, 9 August 1977; 1 spec. USNM#191793: off NJ, 39°40.42 N, 072°00.42 W, 167 m, col. by CABP/VIMS, sta. G6, 27 August 1976; 1 spec. USNM#191849: off NJ, 39°48.54 N, 072°12.06 W, 85 m, col. by CABP/VIMS, sta. G5, 8 March 1977; 4 spec. USNM#191869: off NJ, 39°49.00 N, 072°12.06 W, 90 m, col. by CABP/VIMS, sta. G5, 14 August 1977; 3 spec. USNM#212980: Georges Bank, 40°29.45 N, 067°43.02 W, 164 m, col. by NEEB/MMS/BLM, sta. 23, 7 May 1977; 1 spec. USNM#212984: Georges Bank, 40°27.02 N, 067°31.38 W, 134 m, col. by NEEB/MMS/BLM, sta. 27, 16 February 1977; 1 spec. USNM#212985: Georges Bank, 40°27.18 N, 067°31.42 W, 129 m, col. by NEEB/MMS/BLM, sta. 27, 16 February 1977; 1 spec. USNM#214271: Georges Bank, 40°21.19 N, 068°29.24 W, 105 m, col. by NEEB/MMS/BLM, sta. 8, 6 May 1977; 1 spec. USNM#214272: Georges Bank, 40°21.24 N, 068°29.36 W, 106 m, col. by NEEB/MMS/BLM, sta. 8, 6 May 1977; 2 spec. USNM#214273: Georges Bank, 40°27.20 N, 067°31.20 W, 131 m, col. by NEEB/MMS/BLM, sta. 27, 16 February 1977; 3 spec. USNM#214274: Georges Bank, 40°27.01 N, 067°29.55 W, 131 m, col. by NEEB/MMS/BLM, sta. 26, 6 March 1977; 3 juveniles. USNM#214275: Georges Bank, 40°26.59 N, 067°29.50 W, 131 m, col. by NEEB/MMS/BLM, sta. 26, 6 March 1977; 1 spec. USNM#214276: Georges Bank, 40°26.35 N, 067°35.32 W, 154 m, col. by NEEB/MMS/BLM, sta. 25, 17 February 1977; 4 spec. USNM#214278: Georges Bank, 40°25.12 N, 067°28.41 W, 159 m, col. by NEEB/MMS/BLM, sta. 22, 17 February 1977; 1 juvenile. USNM#214279: Georges Bank, 40°25.12 N, 067°28.41 W, 145 m, col. by NEEB/MMS/BLM, sta. 22, 17 February 1977; 2 spec. USNM#214280: Georges Bank, 40°25.12 N, 067°28.41 W, 137 m, col. by NEEB/MMS/BLM, sta. 22, 17 February 1977; 3 spec. USNM#214314: Georges Bank, 40°27.10 N, 067°31.47 W, 126 m, col. by NEEB/MMS/BLM, sta. 27, August 191977; 1 spec. USNM#214315: Georges Bank, 40°27.16 N, 067°29.56 W, 135 m, col. by NEEB/MMS/BLM, sta. 26, 30 August 1977; 2 gravid females. USNM#214316: Georges Bank, 40°27.17 N, 067°30.20 W, 141 m, col. by NEEB/MMS/BLM, sta. 26, 30 August 1977; 4 spec. USNM#214323: Georges Bank, 40°21.28 N, 068°29.36 W, 102 m, col. by NEEB/MMS/BLM, sta. 8, 18 August 1977; 2 spec. USNM#280109: off SC, 194–212 m, col. by C. Biernbaum, September 1983; 10+ spec. USNM#191871: off NJ, 39°16.18 N, 072°29 18 W, 149 m, col. by CABP/VIMS, sta. A3, 7 August 1977; 1 spec. USNM#214284: Georges Bank, 40°21.36 N, 068°29.11 W, 146 m, NEEB/MMS/BLM, sta. 8, 16 February 1977; 1 spec. USNM#36411: off Newport, RI, 210.5 m, col. by Usfc, Fishhawk R/V, sta. 871 1880; 2 spec. USNM#8717: So. of Marthas Vineyard, MA, 179.3 m, col. by Usfc, Albatross R/V, sta. 2245, 26 September 1884; 1 spec.

APPENDIX 4: RECORDS OF IDENTIFIED USNM *POLITOLANA* LOTS USED IN THE BIOGEOGRAPHICAL ANALYSIS IN ADDITION TO THOSE LISTED IN THE SPECIES DESCRIPTIONS

Politolana impostor: USNM#86325: Isle Of Shoals, NH, col. by J. Miller, sta. 9, 19 April 1937; 1 spec. (+1 *P. concharum*). USNM#191780: off DE, 38°17.30 N, 74°41.00 W, 29 m, sta. K1, 23 August 1976; 6 mancas.

Series of specimens col. by USFC, R/V Albatross—USNM#5343: off Hatteras, NC, 214.1 m, from mouth of white hake (*Phycis tenuis*, Fam. Phycidae), sta. 2091, 26 September 1883; 1 spec. USNM#10091: off Cape Charles, VA, 37°07.00 N, 74°34.30 W, sta. 2421; 1 cast molt of gravid female. USNM#14642: off NJ, 39°50.00 N + 39°02 N, 71°42 W + 72°36 W, 250.7 m, sta. 25, 822, 583, 18 January 1890; 1 spec.

Series of specimens col. by USFC, R/V Fishhawk—USNM#34505: off Newport, RI, 36.6 m, sta. 803 1880; 1 spec. USNM#35322: off Newport, RI, 183 m, sta. 873 1880; 1 spec. USNM#35323: off Marthas Vineyard, MA, 219.6 m, sta. 876, 13 February 1880; 2 spec. USNM#35326: off Marthas Vineyard, MA, 587.4 m, sta. 1095 1882; 1 spec. USNM#36394: off Marthas

Vineyard, MA, 183 m, sta. 949, 23 August 1881; 2 spec. USNM#39404: off Marthas Vineyard, MA, 287.3 m, sta. 943, 9 August 1881; 2 spec.

Series of specimens from off NJ, col. by CABP/VIMS— USNM#191748: 39°43.42 N, 72°54.42 W, 73–74 m, sta. G3, 8 March 1976; 1 spec. USNM#191762: 38°42.48 N, 73°24.18 W, 80 m, sta. E4, 17 June 1976; 1 spec. USNM#191775: 39°16.30 N, 72°29.54 W, 139 m, sta. A3, 22 June 1976; 1 spec. USNM#191791: 39°43.06 N, 72°54.12 W, 73 m, sta. G3, 27 August 1976; 1 spec. USNM#191794: 39°39.06 N, 71°57.24 W, 310 m, sta. G7, 28 August 1976; 1 spec. USNM#191795: 38°43.30 N, 73°13.54 W, 84 m, sta. F1, 20 August 1976; 1 gravid female. USNM#191796: 38°43.36 N, 73°04.00 W, 153 m, sta. F3, 20 August 1976; 1 spec. USNM#191798: 38°44.12 N, 73°25.36 W, 70 m, sta. E2, 18 August 1976; 1 spec. USNM#191799: 38°47.18 N, 73°23.48 W, 68 m, sta. E1, 17 August 1976; 2 spec. USNM#191803: 39°29.54 N, 73°10.06 W, 41 m, sta. B4, 21 August 1976; 1 spec. USNM#191804: 39°14.18 N, 72°46.48 W, 90 m, sta. A1, 21 August 1976; 10+ spec. USNM#191817: 38°42.54 N, 73°19.12 W, 74 m, sta. El1, 11 November 1976; 1 manca. USNM#191822: 39°26.06 N, 73°08.24 W, 58 m, sta. Bf3, 15 November 1976; 1 spec. USNM#191826: 39°22.18 N, 73°03.30 W, 66 m, sta. Br3, 14 November 1976; 1 spec. USNM#191829: 38°44.06 N, 73°14.42 W, 85 m, sta. F1, 12 November 1976; 3 spec. USNM#191830: 38°44.30 N, 73°03.12 W, 179 m, sta. F4, 12 November 1976; 1 spec. USNM#191836: 38°44.06 N, 73°25.00 W, 72 m, sta. E2, 11 November 1976; 5 spec. USNM#191838: 38°43.00 N, 73°24.24 W, 78 m, sta. E4, 11 November 1976; 2 spec. USNM#191847: 39°43.00 N, 72°54.06 W, 71 m, sta. G3, 8 March 1977; 2 spec. USNM#191850: 39°40.30 N, 72°00.42 W, 174 m, sta. G6, 9 March 1977; 1 spec. USNM#191852: 38°44.18 N, 73°08.54 W, 103 m, sta. F2, 10 February 1977; 3 spec. USNM#191854: 38°41.12 N, 73°32 12 W, 63 m, sta. E3, 9 February 1977; 1 spec (+1 *P. concharum*). USNM#191855: 38°42.48 N, 73°24.24 W, 77 m, sta. E4, 9 February 1977; 1 spec. USNM#191857: 39°21.36 N, 72°31.00 W, 128 m, sta. A2, 12 February 1977; 1 spec. USNM#191867: 39°43.06 N, 72°54.12 W, 74 m, sta. G3, 14 August 1977; 1 spec. USNM#191874: 38°41.12 N, 73°31.48 W, 66 m, sta. E3, 11 August 1977; 2 spec. USNM#191875: 38°42.42 N, 73°24.54 W, 80 m, sta. E4, 11 August 1977; 1 spec. Series of specimens from Georges Bank, col. by NEEB/Mms/BLM— USNM#212976: 41°34.06 N, 66°34.37 W, 85 m, sta. 31, 11 May 1977; 1 spec. USNM#212981: 40°41.08 N, 67°35.36 W, 85 m, sta. 13, 23 May 1977; 2 spec. USNM#214254: 41°09.15 N, 66°40.24 W, 81 m, sta. 30, 10 May 1977; 1 spec. USNM#214270: 40°41.07 N, 67°35.39 W, 84 m, sta. 13, 23 May 1977; 1 spec. USNM#214283: 40°43.43 N, 67°33.30 W, 84 m, sta. 15, 18 February 1977; 1 spec.

Politolana polita. USNM#25194: near Swampscott, MA, 7.3 m, col. by S. Tufts, A.E. Verrill, April 1857; 2 spec. USNM#39403: Massachusetts Bay, MA, 12.8 m, col. by USFC, Speedwell R/V, sta. 231, 23 September 1878; 1 spec. USNM#191860: off DE, 38°04.30 N, 74°01.36 W, 103 m, col. by VIMS, MMS/NEBP, sta. K4, 16 August 1977; 10+ spec. (+1 unidentified spec.).

Series of specimens from off NJ, col. by VIMS, MMS/NEBP—USNM#191755: 39°14.42 N, 72°47.24 W, 90 m, sta. A1, 4 March 1976; 2 (+1 unidentified spec.). USNM#191759: 39°04.36 N, 73°53.30 W, 39–40 m, sta. D1, 21 February 76, 1 spec. (+1 *P. concharum*). USNM#191760: 38°44.18 N, 73°14.36 W, 86 m, sta. F1, 19 June 1976; 1 spec. USNM#191792: 39°53.24 N, 72°43.06 W, 55–56 m, sta. G4, 27 August 1976; 2 spec. (+10 *P. concharum*). USNM#191820: 39°20.06 N, 73°12.42 W, 63 m, sta. Bm5, 15 November 1976; 1 spec. USNM#191823: 39°34.18 N, 73°12.36 W, 42 m, sta. Bp1, 15 November 1976; 1 spec. USNM#191824: 38°42.30 N, 73°25.36 W, 73 m, sta. Es4, 9 November 1976; 3 spec. USNM#191827: 38°42.54 N, 73°19.12 W, 74 m, sta. El1, 11 November 1976; 1 spec. USNM#191828: 38°42.00 N, 73°19.12 W, 80 m, sta. El3, 11 November 1976; 1 spec. USNM#191837: 38°41.24 N, 73°32.12 W, 65 m, sta. E3, 7 November 1976; 2 spec. USNM#191851: 38°45.24 N, 73°16.18 W, 79 m, sta. F1, 9 February 1977; 1 manca.

Series of specimens from Georges Bank, col. by MMS/NEBP—USNM#212974: 41°30.26 N, 66°44.13 W, 74 m, sta. 32, 20 May 1977; 1 spec. USNM#214243: 40°39.40 N, 69°27.10 W, 54 m, sta. 3, 6 May 1977; 1 spec. USNM#214244: 40°39.45 N, 69°27.10 W, 53 m, sta. 3, 6 May 1977; 4 spec. USNM#214245: 40°39.46 N, 69°27.13 W, 54 m, sta. 3, 6 May 1977; 3 spec. USNM#214247: 40°43.18 N, 69°52.27 W, 40 m, sta. 2, 6 May 1977; 3 spec. USNM#214248: 40°43.04 N, 69°52.48 W, 44 m, sta. 2, 6 May 1977; 3 spec. USNM#214249: 40°43.22 N, 69°52.35 W, 43 m, sta. 2, 6 May 1977; 1 spec. USNM#214253: 41°30.36 N, 66°44.14 W, 74 m, sta. 32, 20 May 1977; 1 (+1 *P. concharum*). USNM#214256: 40°51.22 N, 68°00.20 W, 59 m, sta. 11, 8 May 1977; 1 manca. USNM#214257: 40°51.17 N, 68°00.15 W, 59 m, sta. 11, 8 May 1977; 1 spec. USNM#214258: 40°51.09 N, 68°00.08 W, 60 m, sta. 11, 8 May 1977; 3 spec. USNM#214259: 40°58.40 N, 67°50.21 W, 54 m, sta. 10, 8 May 1977; 1 spec. USNM#214261: 40°49.14 N, 68°11.21 W, 58 m, sta. 9, 8 May 1977; 1 manca. USNM#214265: 40°43.59 N, 67°18.36 W, 96 m, sta. 21, 9 May 1977; 1 spec. USNM#214289: 40°57.43 N, 67°33.14 W, 63 m, sta. 17, 20 February 1977; 2 spec. USNM#214291: 40°58.29 N, 67°50.05 W, 48 m, sta. 10, 19 February 1977; 2 spec. USNM#214292: 40°58.29 N, 67°50.05 W, 50 m, sta. 10, 19 February 1977; 2 spec. USNM#214293: 40°39.39 N, 69°27.21 W, 58 m, sta. 3, 15 February 1977; 2 spec.

USNM#214294: 40°43.28 N, 69°51.52 W, 46 m, sta. 2, 15 February 1977; 3 spec. USNM#214295: 40°43.45 N, 69°52.25 W, 45 m, sta. 2, 15 February 1977; 1 spec. USNM#214296: 41°07.12 N, 70°32.58 W, 38 m, sta. 1, 11 February 1977; 1 spec. USNM#214297: 41°07.02 N, 70°33.03 W, 38 m, sta. 1, 11 February 1977; 1 spec. USNM#214298: 40°43.34 N, 69°52.03 W, 42 m, sta. 2, 18 August 1977; 10+ spec. USNM#214299: 40°43.32 N, 69°52.12 W, 42 m, sta. 2, 18 August 1977; 5 mancas. USNM#214300: 40°43.27 N, 69°52.31 W, 45 m, sta. 2, 18 August 1977; 10+ spec. USNM#214303: 40°39 59 N, 69°27.17 W, 50 m, sta. 3, 18 August 1977; 3 spec. USNM#214308: 41°34.26 N, 66°35.16 W, 81 m, sta. 31, August 1977; 1 spec. USNM#214312: 40°53.09 N, 68°00.01 W, 49 m, sta. 12, 20 August 1977; 2 spec.

Politolana concharum. USNM#3852: Woods Hole, MA, col. by V.N. Edwards, USFC & Winter 1882; 50+ spec. USNM#3939. USNM#4047: Off Fishers Island, Long Island Sound, taken in lobster pot, col. by J.H. Latham, USFC, May 1875, 12 spec. USNM#6279: Life saving station, Amagansett, Long Island, on fish: *Microdon* (Family Psuedotriakidae), col. by V.N. Edwards, USFC, 10+ spec. USNM#6643: Woods Hole, MA, col. by V.N. Edwards, 18 January 1883; 2 spec. USNM#11320: Currituck, NC, From *Notidanus griseus* (Family Hexanchidae), 1 spec. USNM#12826: Muskeget Channel, MA, 0 m, USFC, 12 August 1887; 7 spec. USNM#22722: Vineyard Sound, MA, col. by V.N. Edwards, USFC, 1871; 1+ spec. USNM#34509: off Block Island, RI, 27.5 m, col. by USFC, Fishhawk R/V, sta. 828 1880; 1 spec. USNM#35415: Vineyard Sound, MA, col. by USFC, 1875; 8+ spec. USNM#35416: Vineyard Sound, MA, col. by USFC, 1875, 1 spec. USNM#36938: Woods Hole, MA, from surface, col. by V.N. Edwards, USFC, 27 December 1875; 6 spec. USNM#39214: Vineyard Sound, MA, col. by USFC, 12 July 1875; 1 spec. USNM#39391: Vineyard Sound, MA, col. by V.N. Edwards, USFC, May 1876; 9 spec. USNM#43642: Atlantic City, NJ, on Skate used as bait, col. by J.Y. Williams, 1911; 15+ spec. USNM#44336: Woods Hole, MA, col. by V.N. Edwards, USFC & Winter 1882; 4 spec. USNM#60661: off NJ, on Atlantic mackerel (*Scomber scombrus*, Family Scombridae), col. by D.E. Sette, May 1926; 2 spec. USNM#64424: off New England Creek, Delaware Bay, NJ, 1.8 m, col. by H.G. Richards, sta. 63, 22 January 1930; 2 spec. USNM#65888: on piles, Cape May, NJ, col. by H.G. Richards, sta. 167, 24 February 1929; 1 spec. USNM#65889: off Henlopen, DE, 40.3 m, col. by H.G. Richards, sta. 66, 18 February 1930; 1 spec. USNM#86312: outside Beaufort, NC, col. by A.S. Pearse, sta. 305, 14 July 1941. USNM#86325: Isle Of Shoals, NH, col. by J. Miller, sta. 9, 19 April 1937; 1 spec. (+1 *P. impostor* spec.). USNM#174706: off North Carolina, NC, box core, 33°00.57 N, 77°20.12 W, 317.5 m, col. by TI/SABP, sta. 1f, 10 February 1977. USNM#174707: off SC, Box Core, 32°04.59 N, 79°37.58 W, 39 m, col. by TI/SABP, sta. 3d, 17 February 1977. USNM#236080: Delaware Bay, 2 August 1952, 1 spec.

Series of specimens from off DE, col. by VIMS/CABP—USNM#191739: 38°17.30 N, 74°41 W, 29 m, sta. K1, 2 March 1976; 1 spec. USNM#191740: 38°17.30 N, 74°41.00 W, 29 m, sta. K1, 2 March 1976; 1 spec. USNM#191742: 38°08.00 N, 74°13.00 W, 53 m, sta. K3, 12 March 1976; 10+ spec. USNM#191781: 38°08.00 N, 74°12.54 W, 53 m, sta. K3, 23 August 1976; 6 spec. USNM#191840: 38°12.30 N, 74°26.36 W, 40 m, sta. K2, 16 February 1977; 3 spec. USNM#191859: 38°13.24 N, 74°27.54 W, 42 m, sta. K2, 16 August 1977; 7 spec.

Series of specimens from off NJ, col. by VIMS/CABP—USNM#191746: 39°53.24 N, 72°43.12 W, 55 m, sta. G4, 8 March 1976; 3 spec. USNM#191747: 39°53.24 N, 72°43.12 W, 55 m, sta. G4, 8 March 1976; 2 spec. USNM#191749: 39°43.42 N, 72°54.42 W, 73–74 m, sta. G3, 8 March 1976; 1 spec. USNM#191751: 39°43.36 N, 73°34.48 W, 37 m, sta. G2, 8 March 1976; 2 spec. USNM#191753: 39°43.36 N, 73°34.48 W, 37 m, sta. G2, 8 March 1976; 2 spec. USNM#191754: 39°51.24 N, 73°53.06 W, 27 m, sta. G1, 8 March 1976; 1 spec. USNM#191759: 39°04.36 N, 73°53.30 W, 39–40 m, sta. D1, 21 February 76, 1 spec. (+1 *P. polita*). USNM#191764: 39°02.54 N, 73°47.06 W, 51 m, sta. D4, 17 June 1976; 1 spec. USNM#191766: 39°15.12 N, 74°09.06 W, 25 m, sta. C3, 16 June 1976; 3 spec. USNM#191767: 39°15.12 N, 74°09.06 W, 25 m, sta. C3, 16 June 1976; 1 spec. USNM#191768: 39°15.12 N, 74°09.06 W, 25 m, sta. C3, 16 June 1976; 1 spec. USNM#191790: 39°43.42 N, 73°34.54 W, 36.5 m, sta. G2, 26 August 1976; 1 spec. USNM#191800: 39°04.42 N, 73°51.12 W, 31 m, sta. D1, 17 August 1976; 10+ spec. USNM#191801: 39°20.54 N, 74°05.12 W, 25 m, sta. C2, 16 August 1976; 1 spec. USNM#191805: 39°33.30 N, 73°05.30 W, 48 m, sta. Bp5, 15 November 1976; 1 spec. USNM#191806: 39°32.54 N, 73°09.30 W, 42 m, sta. Bp3, 15 November 1976; 3 spec. USNM#191807: 38°40.30 N, 73°35.00 W, 61 m, sta. Ef8, 9 November 1976; 1 spec. USNM#191809: 39°29.30 N, 73°09.00 W, 45 m, sta. Bp8, 15 November 1976; 10+ spec. USNM#191810: 38°47.18 N, 73°35.00 W, 52 m, sta. Er3, 10 November 1976; 20+ spec. USNM#191811: 38°48.00 N, 73°33.48 W, 54 m, sta. Er4, 10 November 1976; 10+ spec. USNM#191812: 39°32.36 N, 73°13.06 W, 41 m, sta. Bp2, 15 November 1976; 10+ spec. USNM#191814: 39°31.18 N, 73°07.54 W, 46 m, sta. Bp6, 15 November 1976; 1 spec. USNM#191815: 39°19.48 N, 72°58.30 W, 65 m, sta. Br4, 15 November 1976; 1 spec. USNM#191819: 39°30.42 N, 73°07.12 W, 47 m, sta. Bp7, 15 November 1976; 2 spec. USNM#191821: 39°30.00 N, 72°57.54 W, 63 m, sta. Br5, 15 November 1976; 2 spec.

USNM#191825: 38°46.06 N, 73°34.48 W, 62 m, sta. Ef4, 10 November 1976; 1 spec. USNM#191833: 39°04.36 N, 73°51.06 W, 30 m, sta. D1, 7 November 1976; 10+ spec. USNM#191835: 38°49.00 N, 73°25.24 W, 63 m, sta. E1, 9 November 1976; 5 spec. USNM#191848: 39°53.30 N, 72°43.06 W, 56 m, sta. G4, 8 March 1977; 6 spec. USNM#191853: 38°49.00 N, 73°25.18 W, 60 m, sta. E1, 9 February 1977; 7 spec. USNM#191854: 38°41.12 N, 73°32 12 W, 63 m, sta. E3, 9 February 1977; 1 spec (+1 *P. impostor*). USNM#191868: 39°53.30 N, 72°43.06 W, 56 m, sta. G4, 14 August 1977; 5 spec. USNM#191872: 38°49.06 N, 73°25.18 W, 63 m, sta. E1, 11 August 1977; 10+ spec.

Series of specimens from Georges Bank, col. by MMS/NEBP—USNM#212971: 41°26.05 N, 67°59.45 W, 39 m, sta. 37, 18 May 1977; 1 spec. USNM#212973: 41°50.19 N, 66°51.37 W, 69 m, sta. 34, 20 May 1977, 1 spec. USNM#212975: 41°34.19 N, 66°35.11 W, 84 m, sta. 31, 11 May 1977; 2 spec. USNM#212979: 40°35.01 N, 67°11.59 W, 121 m, sta. 24, 9 May 1977; 3 spec. USNM#212986: 40°57.43 N, 67°33.14 W, 63 m, sta. 17, 20 February 1977; 2 spec. USNM#214235: 40°35.06 N, 67°11.30 W, 118 m, sta. 24, 20 February 1977; 2 females. USNM#214236: 40°36.09 N, 67°45.07 W, 84 m, sta. 20, 7 May 1977; 4 spec. USNM#214237: 40°58.30 N, 66°55.28 W, 78 m, sta. 29, 10 May 1977; 1 spec. USNM#214238: 40°37.38 N, 69°02.32 W, 75 m, sta. 5, 6 May 1977; 2 spec. USNM#214239: 40°41.31 N, 69°02.49 W, 80 m, sta. 4, 24 May 1977; 1 spec. USNM#214241: 40°49.20 N, 68°11.13 W, 57 m, sta. 9, 8 May 1977; 1 male (+2 *P. polita*). USNM#214251: 41°50.22 N, 66°50.35 W, 73 m, sta. 34, 20 May 1977; 15+ spec. USNM#214253: 41°30.36 N, 66°44.14 W, 74 m, sta. 32, 20 May 1977; 1 (+1 *P. polita*). USNM#214255: 40°58.24 N, 66°55.04 W, 73 m, sta. 29, 10 May 1977; 4 spec. USNM#214260: 40°58.46 N, 67°50.33 W, 52 m, sta. 10, 8 May 1977; 1 spec. USNM#214262: 40°37.42 N, 69°02.41 W, 75 m, sta. 5, 6 May 1977; 4 spec. USNM#214263: 40°37.39 N, 69°02.11 W, 74 m, sta. 5, 6 May 1977; 3 spec. USNM#214264: 40°41.40 N, 69°02.22 W, 73 m, sta. 4, 24 May 1977; 1 spec. USNM#214266: 40°36.11 N, 67°45.04 W, 84 m, sta. 20, 7 May 1977; 1, manca. USNM#214267: 40°36.00 N, 67°44.31 W, 83 m, sta. 20, 7 May 1977; 4 spec. USNM#214268: 40°43.47 N, 67°36.42 W, 80 m, sta. 14, 8 May 1977; 1 spec. USNM#214269: 40°43.28 N, 67°36.26 W, 79 m, sta. 14, 8 May 1977; 1 spec. USNM#214277: 40°35.06 N, 67°11.30 W, 119 m, sta. 24, 20 February 1977; 1 spec. USNM#214281: 40°35.58 N, 67°44.39 W, 78 m, sta. 20, 18 February 1977; 1 manca. USNM#214282: 40°35.58 N, 67°44.39 W, 76 m, sta. 20, 18 February 1977; 1 manca. USNM#214287: 40°58.22 N, 66°54.58 W, 68 m, sta. 29, 20 February 1977; 1 spec. USNM#214288: 40°58.22 N, 66°54.58 W, 68 m, sta. 29, 20 February 1977; 2 spec. USNM#214290: 40°53.08 N, 67°59.53 W, 50 m, sta. 12, 19 February 1977; 2 spec. USNM#214301: 40°40.02 N, 69°27.17 W, 47 m, sta. 3, 18 August 1977; 1 manca. USNM#214304: 40°39.45 N, 69°27.22 W, 53 m, sta. 3, 18 August 1977; 5 spec. USNM#214305: 41°26.39 N, 67°59.23 W, 37 m, sta. 37, 27 August 1977; 2 spec. USNM#214306: 41°50.07 N, 66°50.45 W, 72 m, sta. 34, 22 August 1977; 5 spec. USNM#214307: 41°49.59 N, 66°50.59 W, 71 m, sta. 34, 22 August 1977; 2 spec. USNM#214309: 41°09.22 N, 66°40.14 W, 82 m, sta. 30, 21 August 1977; 1 spec. USNM#214310: 40°58.02 N, 66°54.57 W, 74 m, sta. 29, 21 August 1977; 5 spec. USNM#214311: 40°58.50 N, 66°55.05 W, 71 m, sta. 29, 21 August 1977; 2 spec. USNM#214317: 40°35.44 N, 67°44.27 W, 83 m, sta. 20, 20 August 1977; 1 spec. USNM#214318: 40°36.17 N, 67°44.51 W, 81 m, sta. 20, 20 August 1977; 2 spec. USNM#214319: 40°36.16 N, 67°44.54 W, 81 m, sta. 20, 20 August 1977; 1 spec. USNM#214320: 40°36.06 N, 67°44.54 W, 82 m, sta. 20, 20 August 1977; 1 spec.

Politolana impressa. USNM#34477: Vineyard Sound, MA, 486.8 m, col. by USFC, Fishhawk R/V, sta. 999 1881; 2 juveniles. USNM#67699: from *Coelorhinchus* (Family Macrouridae), col. by Longley; 1 female. USNM#173732: continental slope off NC, 36°40.24 N, 74°40.00 W, 335 m, Otter Trawl, col. by Iselin R/V, Cruise Ci 73 10, sta. 44, 7 June 1973; 1 spec. USNM#236082: 27°04.00 N, 79°18.80 W, 610 m, collected in a fish trap, Alvin R/V, sta. F 6, May 1977; 2 cast molts. USNM#191779: off VA, 37°04.36 N, 74°33.12 W, 325–340 m, col. by VIMS, MMS/NEBP, sta. L6, 1 September 1976; 2 spec.

Series of specimens from off DE, col. by VIMS, MMS/NEBP—USNM#191784: 38°00.36 N, 73°51.54 W, 339–370 m, sta. K6, 31 August 1976; 2 spec. USNM#191842: 38°00.42 N, 73°51.48 W, 370 m, sta. K6, 12 March 1977; 4 spec. USNM#191861: 38°01.30 N, 73°53.54 W, 150 m, sta. K5, 15 August 1977; 1 spec.

Series of specimens from off NJ, col. by VIMS, MMS/NEBP—USNM#191785: 38°45.12 N, 73°01.00 W, 350 m, sta. J1, 29 August 1976; 3 spec. USNM#191788: 39°06.00 N, 72°40.18 W, 460 m, sta. I4, 29 August 1976; 3 spec. USNM#191789: 39°12.06 N, 72°23.36 W, 390 m, sta. H1, 28 August 1976; 10+ spec. USNM#191843: 38°45.12 N, 73°00.48 W, 362 m, sta. J1, 10 February 1977; 1 manca. USNM#191846: 39°12.12 N, 72°23.30 W, 400 m, sta. H1, 9 March 1977; 1 spec. USNM#191866: 39°12.18 N, 72°23.54 W, 390 m, sta. H1, 8 August 1977; 1 gravid female.

Series of specimens from Northern Slope, Georges Bank, col. by MMS/NEBP—USNM#212982: 42°13.08 N, 67°34.20 W, 242 m, sta. 35, 19 May 1977; 1 spec. USNM#212983: 42°13.05 N, 67°33.40 W, 244 m, sta. 35, 19 May 1977; 1 spec.