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The squid family Magnapinnidae (Mollusca: Cephalopoda) in the Atlantic Ocean, with a description of a new species

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Abstract.—We describe here *Magnapinna atlantica*, a new species of oegopsid squid in the Magnapinnidae. This is the second described species in the family. The new species is based on two specimens, one of which is in excellent condition. This species has the following characters that are unique within the family: Tentacles more slender than adjacent arms, and proximal region of tentacles without suckers and bearing large glandular swellings. A third species is described but not named due to the poor condition of the squid. We also transfer *Mastigoteuthis talismani* to the Magnapinnidae, along with another squid, long known in the literature but incorrectly identified.

The Magnapinnidae is an obscure deep-sea squid family closely related to the chiroteuthid-group of families. Only a single species, *Magnapinna pacifica* Vecchione & Young, 1998 has been described in the Magnapinnidae. That species was based on three juvenile specimens from the North Pacific between California and Hawaii. Numerous large, deep-living but unidentified squids, thought to belong to this family, however, have been reported from ROV or manned submersible sightings throughout the world (Vecchione et al. 2001, Guerra et al. 2002, Fig. 4e). We report here a new species of *Magnapinna* from the North Atlantic Ocean. Our species is based primarily on a specimen from the Gulf of Mexico that was collected intact with damage only to the tips of the appendages. A second specimen of the new species described herein from near the Azores has subsequently been found in the collections of the RRS *Discovery* at the Southampton Institution of Oceanography, U.K. A third species reported here, but not named, was taken from the high-latitude, mid-North Atlantic. The sizes of the tentacles of these two Atlantic species suggest that two previously known squids, *Mastigoteuthis talismani* from the central North Atlantic and an unnamed specimen at the Natural History Museum (London) from the South Atlantic, are also members of this family. These species indicate a wide distribution for the family, supporting the possibility that deep sightings of the large, unidentified squid are members of this family.

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Systematics

Magnapinnidae Vecchione & Young, 1998

Diagnosis.—Fins very large, length equal to or greater than squid length from posterior tip of muscular mantle to tips of arms and tentacles (not including vermiform extensions), width of fins approximates length. Arms and tentacles in two

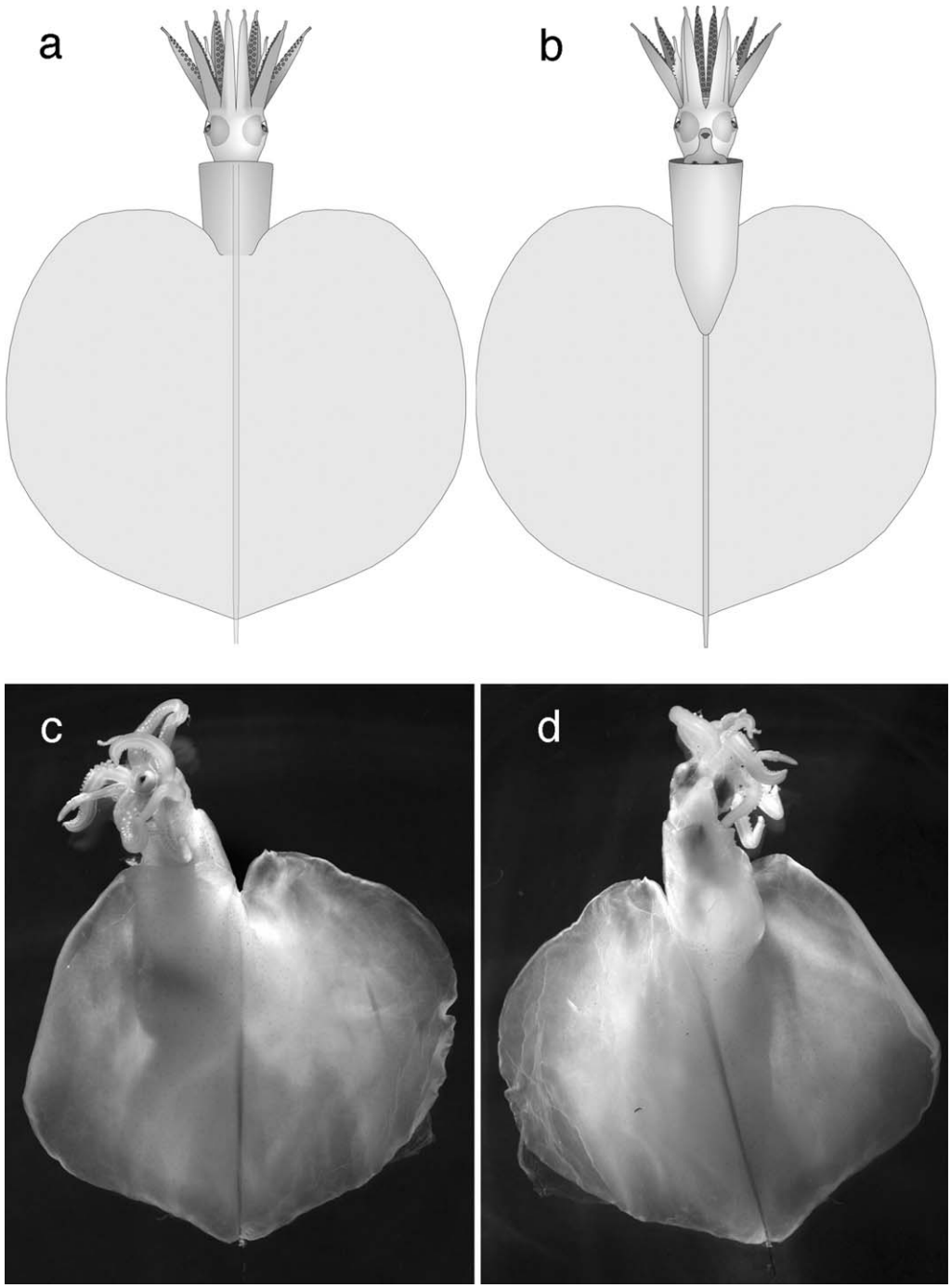

Fig. 1. *Magnapinna atlantica*. Holotype: (a) dorsal view, drawing; (b) ventral view, drawing; (c) dorsal view, photograph of preserved squid; (d) ventral view, photograph of preserved squid.

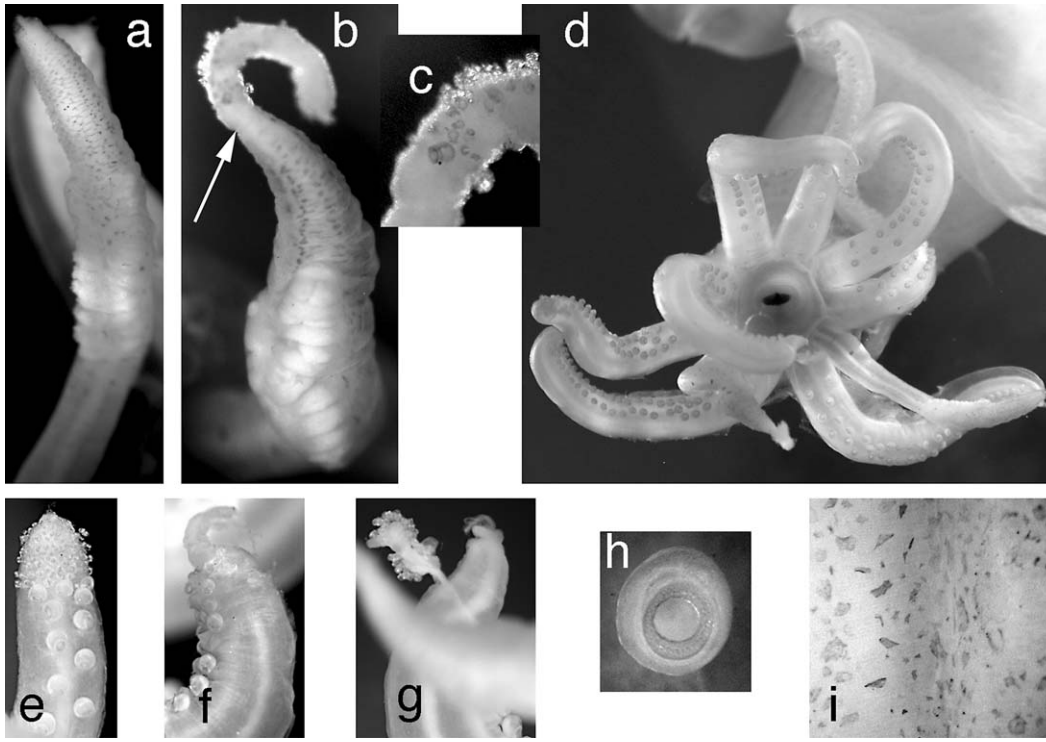

Fig. 2. *Magnapinna atlantica*. Holotype: (a) aboral view of left tentacle with vermiform region broken off; (b) aboral-lateral view of right tentacle with base of vermiform region [arrow points to the separation between the proximal and distal (verimform) regions of the tentacle]; (c) enlarged view of base of vermiform region showing numerous small suckers and one large sucker at proximal end; (d) oral view of brachial crown; (e) oral view of right arm IV with vermiform region missing but many small suckers at end of proximal region; (f) lateral view of left arm II showing remnant of vermiform region; (g) aboral view of right arm II showing nearly detached base of vermiform region bearing small suckers; (h) oral view of large arm sucker; (i) dorsal view of midline between fins showing large chromatophores.

sections, proximal, relatively thick region and distal thin, vermiform region. Tentacles without keels, terminal pad or locking apparatus; proximal tentacle with or without suckers. Arms suckers with bi- to quadra-serial suckers in some regions. Photophores absent. Funnel-locking apparatus with oval depression. Buccal connectives attach to ventral margins of ventral arms.

Magnapinna Vecchione & Young, 1998

Monogeneric family. See family diagnosis.

Magnapinna atlantica, new species
Figs. 1–3, 4f

Material examined.—Holotype (Figs. 1, 2, National Museum of Natural History cat. no. USNM 1086800), 59 mm mantle length, immature female, captured in Gulf of Mexico at 27°09′N, 086°07′W on 16 Sep 1995. Paratype (Fig. 3, Natural History Museum, London cat. no. BMNH 20060134), 53 mm mantle length, immature male, captured over mid-Atlantic Ridge near Azores on 21 Jun 1997 at *Discovery* sta. 13198 #7, 37°14′N, 032°18′W.

Diagnosis.—Arm suckers biserial, except at distal ends. Tentacles narrower than adjacent arms. Proximal region of club without suckers and with aboral-lateral glandular lobes. Pigment primarily in large chromatophores.

Description.—Arms short, thick, weakly muscled and decreasing abruptly in

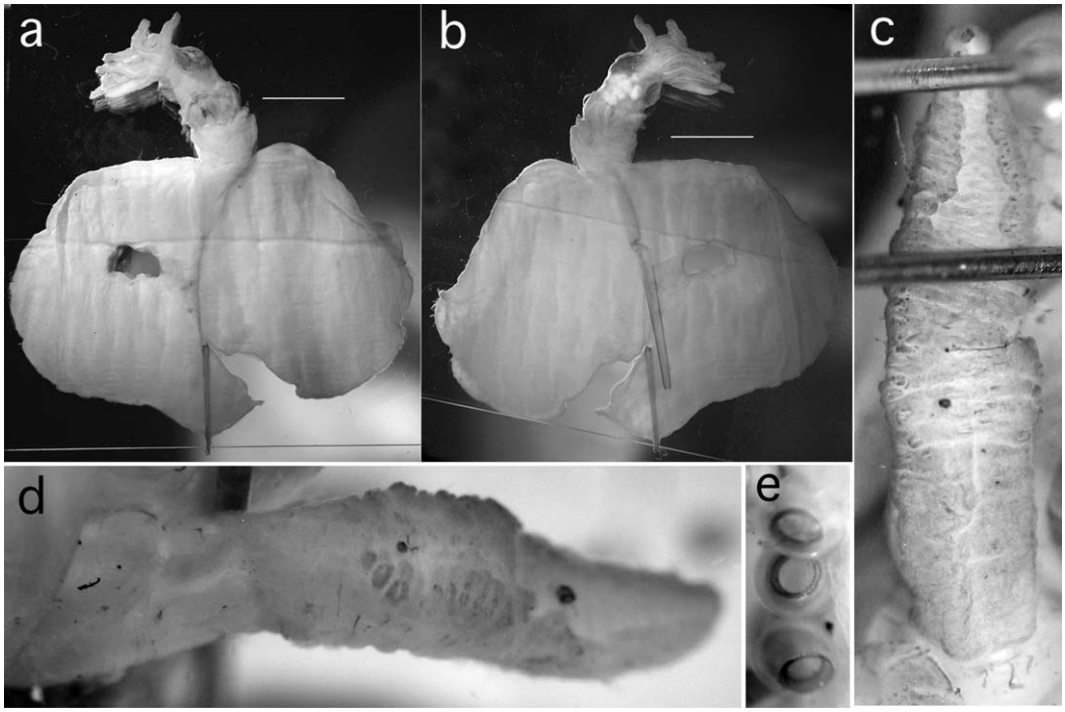

Fig. 3. *Magnapinna atlantica*. Paratype: (a) ventral view; (b) dorsal view. Figures a and b with glass slide placed over fins to hold them flat. Ridges on fins as artifact resulting from shipment of squid. Scale: 10 mm. (c) oral view of right tentacle. Note two suckers present, one at broken tip and other midway along tentacle; (d) oblique oral view of left tentacle. Note two suckers present, small one near base of glandular region and larger one midway from first sucker to broken tip. Figures c and d stained with methylene blue to enhance surface structure. Figure c with two insect pins holding tentacle in position. (e) side view of portion of arm IV showing suckers with smooth sucker rings.

diameter distally becoming vermiform (mostly lost due to damage) and bearing small suckers (Fig. 2e–g). Arms with suckers in two series, occasionally appearing slightly irregular (Fig. 2d). Some arms showing numerous, small, irregularly arranged suckers near tip just proximal to vermiform regions (Fig. 2e). Large suckers of arms 0.4 mm in diameter (fleshy width); suckers of vermiform regions 0.1 mm in diameter (fleshy width), outer ring just slightly smaller. Inner rings of arm suckers smooth (Fig. 2h). Arms without protective membranes or keels, except arms IV which have broad lateral membranes. Tentacles short, thin in proximal region and without suckers; distal (= vermiform) region very narrow and bearing very small suckers, mostly about 0.08 mm in diameter (Fig. 2c). Tentacle bases much narrower than bases of adjacent arms. Distal 0.33–0.67 of proximal region of tentacle bearing large, apparently glandular, lobes (Fig. 2a, b). Head without excavation on ventral surface between funnel adductors. Eyes large; eye openings circular and without ocular sinuses; pigmented iris present. Olfactory organs on long stalks at posterolateral margins of eyes. Beaks not extracted. Funnel component of funnel/mantle-locking apparatus with deep, nearly circular groove. Mantle component of locking apparatus nearly semicircular in lateral profile, slightly more compressed in anterior profile. Mantle wall thick but mostly occupied by gelatinous tissue. Fins extremely large, about

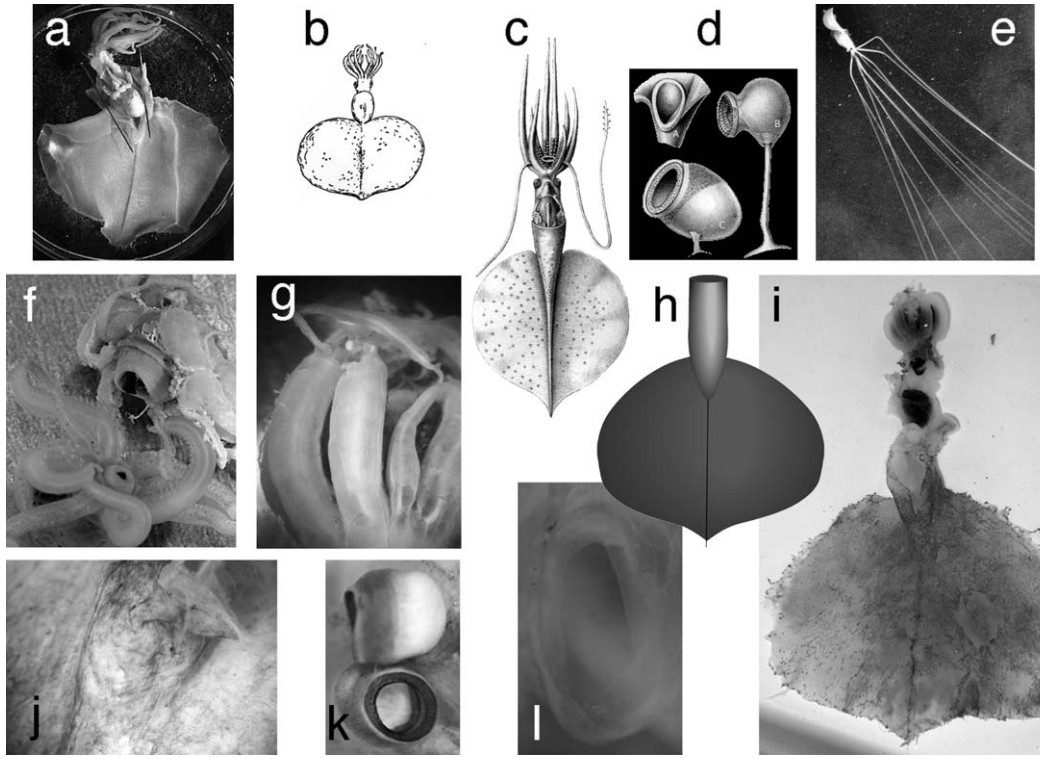

Fig. 4. (a–b) BMNH specimen; (a) ventral view of preserved squid with mantle cut open (photograph by Wen-Sung Chung); (b) dorsal view, [drawing from Hardy (1956)]; (c, d) *Magnapinna talismani*; (c) ventral view [drawing from Fischer & Joubin (1907); see that paper for larger drawing]; (d) oral view of funnel locking-apparatus, side view of tentacle sucker of vermiform region, oral-lateral view of arm sucker [drawings from Fischer & Joubin 1907)]; (e) unidentified deep-sea squid, lateral view, Gulf of Mexico, in situ video frame; (f) oral views (*M. talismani* above, *M. atlantica* below) to compare buccal mass sizes between species; (g–l) *Magnapinna* sp. A: (g) lateral view of brachial crown showing relative thickness of arms and tentacles; (h) ventral view of mantle and fins to show the fin: mantle ratio, drawing; (i) ventral view (photograph taken before fixation); (j) ventral view of fins and posterior end of mantle, high magnification showing lack of chromatophores; (k) lateral and oral view of arms suckers; (l) frontal view of funnel locking-apparatus.

90% of mantle length and without "white nodules" (see comments on *M. talismani*). Fins appear not to have been drawn out into V-shaped point posteriorly. Tail in form of bare gladius with tip missing, extends at least 4 mm beyond fins. Gladius not extracted but with long secondary conus. Photophores absent. Tentacles with numerous chromatophores in glandular region only; only few, scattered chromatophores more proximally. Arms with few scattered chromatophores aborally at bases; otherwise without chromatophores. Arms with very light (barely detectable), brown integumental pigmentation at oral bases. Head, mantle, funnel, collars, and fins with numerous scattered chromatophores (Fig. 2i). Ink sac, anal valves, and thin, greatly expanded caecum present. Cyclindrical, orange digestive gland abuts cephalic cartilage. Gonad in holotype appears to be an ovary due to irregular surface; nidamental glands not apparent. Elongate male terminal organ with spade-shaped tip visible in paratype.

Counts and measurements.—(mm; arm and tentacle lengths are for the proximal

regions only, exclusive of the vermiform extensions). Abbreviations: FL = fin length, FW = fin width, HL = head length, HW = head width, ML = mantle length, MW = mantle width, TL = tentacle length. Holotype: ML—59, MW—9, FL—53, FW—60, Tail Length—4+, Eye Diameter—4, Lens Diameter—1.8, HL—6, HW—8, Arm I length—11.5, Arm II length—12, Arm III length—11.5, Arm IV length—12.5, TL (left)—10, TL (right.)—7, Arm Sucker Count (arm II, left)—22 pairs of large suckers, Tentacle width at base—1.4, Arm IV width at base—2.2. Paratype: ML—53, FL—41, FW—ca. 52, Tail Length—2+, Eye Diameter—ca. 4.5, Lens Diameter—1.7, HW—7, Arm I length (right)—9, Arm I length (left)—8.5, Arm II length (right)—ca. 8.5, Arm II length (left)—10, Arm III length (right)—8.5, Arm III (left)—9, Arm IV length (right)—10, Arm IV length (left)—ca. 10.

Etymology.—The species derives its name from its occurrence in the North Atlantic Ocean.

Magnapinna species A
Fig. 4g–l

Material examined.—Immature male (Bergen Museum cat. no. ZMBN 77634), 95 mm ML captured by the R/V *G. O. Sars* (MAR-ECO cruise super station 46, local station 374) at 42.8°N, 29.3°W on 11 Jul 2004.

Diagnosis.—Arms biserial, except at distal ends. Tentacles narrower than adjacent arms. Proximal region of tentacle without suckers and without aboral-lateral glandular lobes. Chromatophores absent.

Description.—Squid badly damaged, measurements of arm and tentacle lengths not possible. Arms with suckers in two tightly packed series. No indication of distal vermiform region due to damage. Arm suckers with smooth inner rings (Fig. 4k). Diameter of large arm suckers 0.5 mm (fleshy diameter). Tentacles at bases much thinner than adjacent arms (Fig. 4g), bare in proximal region, without trace of glandular swellings, skin missing. Proximal region of tentacle tapers gradually into distal region. Distal region badly damaged, but remnants of tiny suckers (without sucker rings) appear to be present. Funnel locking-apparatus with elongate, oval depression. Fins with damaged fringes but without obvious anterior lobes. Fins without "white nodules." Ratio of fin length to mantle length unusually low, about 0.7 (Fig. 4h), possibly due to mantle damage during capture. Squid with moderate epidermal purple-brown pigmentation on fins and mantle (Fig. 4i), giving it general dark appearance. Oral surfaces of arms much more darkly pigmented. Chromatophores absent (Fig. 4j).

Measurements.—(mm). ML—95, FL—62, FW—66, Tail L—6+, Tentacle width at base—2.9, Arm IV thickness at base—5.6.

Discussion

The presence of large, glandular regions on the proximal tentacles distinguishes *Magnapinna atlantica* from all other known magnapinnids. The Atlantic magnapinnids, *M. atlantica, M.* sp. A, and two other known squid specimens from the Atlantic not previously placed in the Magnapinnidae (see below), all differ greatly from *M. pacifica* in having much thinner tentacles, the lack of suckers on the proximal regions of the tentacles, two sucker series on the arms, rather than three to four, and numerous other features. These differences are great enough to suggest that the Atlantic and Pacific species may belong in separate genera.

One of the squids not previously placed in this family is a named species, *Mastigoteuthis talismani* (Fischer & Joubin, 1907), that is known only from the holotype. That specimen was badly damaged when captured at 34°46′N, 36°11′W

(south of the Azores, North Atlantic) and the condition has deteriorated in preservation. We have examined the type and find it sufficiently similar to *Magnapinna atlantica* that we transfer it here to *Magnapinna*. This is a reversal of our previous opinion (Vecchione & Young 1998), based on the comparative information gained from the Atlantic specimens reported herein. However, several features suggest that *M. atlantica* and *M. talismani* are not conspecific. The tentacles of *M. talismani* lack glandular regions. If the absence was due to damage, we would expect to find some trace of these structures. The ventral surfaces of the fins of *M. talismani* are covered with white "nodules" as seen in the original illustration (Fig. 4c) that were considered by the authors to be possible photophores. No nodules now remain on the holotype of *M. talismani*, and no nodules are found in *M. atlantica*. The fins of *M. talismani* extend to the tip of the gladius, forming an acute apex. This shape is evident in the type illustration (Fig. 4c) and is still apparent in the holotype. Although the posterior end of the fin of *M. atlantica* is slightly damaged, it does not appear to have had the drawn out tip of *M. talismani. Magnapinna talismani* has a much larger buccal mass than *M. atlantica* (Fig. 4f). The original description of *M. talismani* gives a ML of 61 mm, nearly identical with that of the holotype of *M. atlantica*, but this length cannot be verified as the anterior tip of the gladius in the holotype of *M. talismani* is now damaged. The diameter of the buccal mass of *M. talismani* is 1.75 times greater than that of *M. atlantica*. Fischer & Joubin (1907) suggested that the squid had shrunk by 25% at the time of their description by comparing it with an illustration made immediately after capture. This adjustment gives *M. talismani* a ML of 81 mm or 1.25 times that of *M. atlantica* (we include the tail in the ML calculation used here for *M. atlantica* and assume no shrinkage). These corrections adjust the proportional difference in buccal-mass size relative to mantle length to 1.4, still a major discrepancy. Several other features of the original description of *M. talismani* that seem different were incorrect or probably incorrect: lack of a nuchal cartilage (present in holotype), presence of a distinct club (cannot be detected in holotype), and possible antitragus (cannot be detected in holotype).

Magnapinna sp. A differs from all other species in its epidermal pigmentation (chromatophores absent), apparent lack of anterior fin lobes and low FL:ML ratio. It also shares the feature of slender proximal tentacles with the other Atlantic species. This specimen clearly represents a new species of *Magnapinna*, but the squid was too badly damaged during capture to determine most specific characteristics. Therefore, we do not give it a specific name.

A fifth specimen that we place in the Magnapinnidae, illustrated by Hardy (1956), and identified as *Octopodoteuthopsis*, was collected in the South Atlantic and is deposited in the Natural History Museum, London (BMNH). We examined the specimen in the year 2000 but do not have the specimen at hand and cannot offer a definitive description. However, some character states, based on our notes, are available on the world-wide web (Vecchione & Young 2005) and are used for the following comparisons. The arms and tentacles were badly damaged in capture. Nevertheless, this squid is similar to the three other Atlantic specimens of *Magnapinna* in the presence of slender proximal tentacles and two series of suckers on the arms. It is further similar to *M. atlantica* and *M. talismani* in the possession of scattered large chromatophores. In addition to other characters, it differs from *M. atlantica* in lacking glandular regions on the tentacles, from *M. talismani* in the lack of fin nodules, and from *M.* sp. A in the presence of large chromatophores.

Table 1.—Measurements (mm) of mantle length (ML), fin length (FL), and fin width (FW) for species of *Magnapinna* from the Atlantic Ocean.

Species	*M. atlantica* holotype	*M. atlantica* paratype	*M. pacifica* holotype	*M. talismani* holotype	*M.*sp. A	BMNH squid
ML	59	53	51	61	95	79
FL	53	41	39	54	62	59
FW	60	52	34	53	66	76

Apparently. four species of *Magnapinna* exist in the Atlantic Ocean based on five specimens, none of which are completely described, three of which are represented by badly damaged specimens, and two of which are unnamed and should remain that way until better material becomes available (see Table 1 for comparative measurements).

Acknowledgments

We thank Tracey Sutton for sending us the holotype of *M. atlantica* as part of a nice collection of bathypelagic cephalopods donated to NMNH. *Magnapinna* sp. A was collected during the MAR-ECO cruise of the R/V *G. O. Sars*, as a contribution to the Census of Marine Life. Annie Lindgren obtained the paratype of *M. atlantica* for our examination and Amelia MacLellan provided station data.

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