

*MONHYSTERA DISJUNCTA* H. C. BASTIAN, 1865

- Monhyстера disjuncta* H. C. Bastian, 1865, p. 98, pl. 9, figs. 12-13, in sand, tide pool, Falmouth, England.  
*Monhyстера ambigua* H. C. Bastian, 1865, p. 99, pl. 9, figs. 14-15, in sand, tide pool, Falmouth, England.  
*Monhyстера ambiguoides* O. von Bütschli, 1874, p. 261, pl. 2, figs. 7,a-b, on algae, beach zone, Kieler Bucht, Germany.  
*Monhyстера ambigua* J. G. de Man, 1888, pp. 7-9, pl. 1, figs. 4-4,c, North Sea.  
*Monhyстера ricipara* C. A. Allgén, 1929, pp. 472-473, figs. 29,a-b, in algal vegetation, Swedish west coast.  
*Desmolaimus riciparus* C. A. Allgén, 1929, p. 479, figs. 35,a-c, in shell sand, Swedish west coast.  
*Monhyстера ambigua* C. A. Allgén, 1931, p. 247, in algal vegetation, Oslofjord, Norwegian coast.  
*Monhyстера ambigua* C. A. Allgén, 1932, p. 166, under blue-green algae, beach region, Campbell Island.  
*Monhyстера ambigua* C. A. Allgén, 1933, pp. 78-79, with *Zostera* and at depth of 300-400 m., Trondhjemsfjord, Norway.  
*Monhyстера disjuncta* L. de Coninck and J. H. Schuurmans Stekhoven, 1933, p. 141, figs. 145-150.  
*Monhyстера disjuncta* J. H. Schuurmans Stekhoven, 1935, p. 145, fig. 319.  
*Monhyстера disjuncta* G. Otto, 1936, p. 43, fig. 16, in decaying algae, Kielerbucht, German coast.  
*Monhyстера disjuncta* W. Schneider, 1939, p. 169, fig. 290.  
*Monhyстера disjuncta* S. A. Gerlach, 1953, pp. 33-34, figs. 18,a-c, Chilean coast.  
*Monhyстера disjuncta* O. Kinne and S. A. Gerlach, 1953, amphipods (*Gammarus*), Kiel.  
*Monhyстера disjuncta* G. Osche, 1955, p. 256, figs. 1,a-e, between pereopods of *Orchestia gammarellus*, Rovigno, Mediterranean Coast.  
*Monhyстера disjuncta* W. Wieser, 1956, pp. 98, 101.  
*Monhyстера disjuncta* C. A. Allgén, 1959, pp. 192-194, figs. 209,a-b, Fuegian Archipelago, Falkland Is., South Georgia.  
*Monhyстера disjuncta* W. Wieser, 1959, p. 96, figs. 108,a-b, egg capsules of crabs, aquarium, Dept. Oceanography, Univ. Washington, originally from Puget Sound.

Oral opening surrounded by six obscure lips each bearing a minute apical papilla; cephalic setae ten in number, often closely approximated and difficult to distinguish, apparently between 1 and 2  $\mu$  long in our material in which head diameters measured at the base of the setae range from 7 to 10  $\mu$ ; stoma conoid with what appears as three or two serial sclerotized thickenings of the rhabdions and a posterior sclerotized, very slightly dilated part in which two minute denticles were seen in some specimens; amphids circular with rare indications of a break suggesting a unispire condition, positioned one to two cephalic diameters, usually very close to one diameter from anterior end, usually 3-4  $\mu$  in diameter, but in some specimens amphids of only 2  $\mu$  in diameter observed, measurement of their diameter complicated by the fact that external orifice may have a slight overlap of surface cuticle underneath which the sclerotized walls are concave at the sides, and there may or may not be a visible small, round elevation internally near the base from which the amphidial duct presumably proceeds posteriad, this elevation corresponding to the central fleck so common in other forms with circular or unispire amphids; posterior to the amphids in the male, there are commonly (? always) three minute postamphidial setae on each side of the body, 20 to 34  $\mu$  from the anterior end, these being sometimes more or less in a transverse line, sometimes with two at about the same level and one (the most dorsal) about 4 to 5  $\mu$  more posteriad; a second pair of similar small lateral setae have been observed regularly at about 8-10  $\mu$  anterior to the nerve ring, 50-59  $\mu$  from the anterior end; in the female only two postamphidial setae have been observed, either at about the same level (18.5  $\mu$ ), or the dorsolateral one up to as much as 10  $\mu$  posterior to the ventrolateral one; the cervical setae are usually 54 to 71  $\mu$  from the anterior end. In one instance we thought we saw one cervical seta between the position of the postamphidials and the regular cervical setae, but, since all of these setae were not accounted for, it might have been an error. We have searched conscientiously for variation in the numbers of these setae including the examination on both sides of the same individual, but, though there may be differences of as much as 2  $\mu$  in the distance from the anterior end on the two sides of the body (the same being true of the amphids), no differences in numbers could be established. The postamphidial setae appear to be in the same relative positions

on both sides of the body in individuals and the number appears to differ with the sex.

Esophagus cylindroid with very slight swelling of posterior end, not set off as a bulb; nerve ring situated at approximately 60 percent length of esophagus; esophago-intestinal valve elongate, dorsoventrally flattened; progaster unpigmented, shorter than remaining pigmented intestinal cells with the exception of the first pair and with these commonly more or less set off as a slight swelling; remainder of intestine consisting of two rows of rather long intestinal cells containing dense refractive ("pigmented") materials; total intestinal cells probably 36; bacillary layer quite thick. Excretory pore at about same level as amphids, sometimes 1–2  $\mu$  anterior or posterior to these structures; excretory cell extending to 35–110  $\mu$  posterior to base of esophagus, cell itself quite large though often difficult to observe as is the excretory pore, ampulla, and protoplasmic passage; terminal tube from ampulla to pore usually nonrefractive and under 2  $\mu$  in length; cell itself about 20–25  $\mu$  long by 8–10  $\mu$  wide; not accompanied by coelomocytes.

Male 677  $\mu$ –1.52 mm. long; a, 24–35; b, 6.2–10.3; c, 10.9–20; spicules 27–41.8  $\mu$  long; with slight cephalation; blade of spicule alate, ala very delicate so spicule often appears as two narrow refractive lines except when projecting ala is visible; tip region may or may not appear to be slightly offset from blade proper; gubernaculum 7–9  $\mu$ , surrounding spicules, appearance of a slight dorsal sclerotized apophysis variable (the degree of sclerotization of the apophysis illustrated by de Coninck and Schuurmans Stekhoven, 1933, is rare); testis extending to about 20 percent of length of body from anterior end, approaching level of posterior end of excretory cell but never quite reaching it; genital papillae and supplement often (? always) with very inconspicuous setiform projections; one median preanal supplement usually about one-half an anal body diameter preanal, though in a single specimen it appeared to be over one anal body diameter preanal; visible genital papillae highly varied but two or three subventrals between 10 and 20  $\mu$  from tip of tail; two others more difficult to observe may be situated subventrally immediately anterior to the anus and approximately one-half an anal body diameter postanally, but these probably vary in position to a limited extent; if not, there must be at least one which has not been illustrated. In addition, a pair of minute setae was sometimes observed laterally near the tail tip. The caudal glands are three in number, fleshy, and arranged in tandem.

Female 635  $\mu$ –1.453 mm. long; a, 16–37; b, 5.7–10.0; c, 8.7–14.2; v, 86.0–91.9; general appearance highly varied dependent on size and age; youngest and smallest females much the most cylindroid with very even taper posterior to vulva and vulva–anal distance the smallest; such females (Fig. 2,F) usually depositing eggs in the early cleavage stages. As the female becomes larger, absolute length of tail and vulva–anal distance increase (Figs. 2,G and I), and the taper posterior to the vulva and anus increases somewhat disproportionately. The larger females tend to be ovoviviparous. The caudal glands are postanal tandem, large, and fleshy, as in the male. A single pair of lateral or subventral inconspicuous setae (Fig. 2,G) has been seen on some specimens and presumably exists on all but was not always observed. The ovary, like the testis, is outstretched and extends

nearly to the posterior end of the excretory cell; in our material there are consistently two or more oöcytes at any given level of the growth zone.

Eggs oval to spheroid, 28–46 by 27–34  $\mu$ ; shell smooth, vitelline membrane very delicate but observed in numerous cases; stage at deposition, one cell, various cleavage stages to containing fully mature larva ready to hatch; older females usually ovoviviparous; hatched larva 170 long by 6  $\mu$  wide; amphids relatively farther back on neck in relation to head diameter than older larvae.

SOURCE: Collected from decaying algae, near the Pacific Marine Station, College of the Pacific, Dillon Beach, California July 14, 1959.

SYSTEMATIC RELATIONSHIPS: To our knowledge, this is the first record of the occurrence of a single lateral cervical papilla or seta in an adenophore, and whether or not it is the homologue of the cervical papillae (deirids) characteristic of entire orders and superfamilies of secernents is questionable. Adenophores commonly have either paired sublateral or lateral rows of somatic setae over the length of the body or an indeterminate number of such papillae or setae. If the presently observed cervical setae were opposite to, or just posterior to the nerve ring, we would be much more tempted to claim these as the forerunners of the deirids. Much critical microscopy will be necessary to determine their existence or absence in other adenophores.

TAXONOMIC DISCUSSION: Upon the basis of the descriptions and illustrations extant, *M. disjuncta* has only six cephalic setae, no postamphidial or cervical setae, and no denticles in the very slight stomatal dilation. Yet de Coninck (1943) in proposing his species *M. paradisjuncta*, after having differentiated it from *M. disjuncta* on the basis of the number of cephalic setae (ten in that species) and a row of from three to six denticles in the dilation, stated "*Il n'est pas impossible que des recherches ultérieures feront rentrer notre espèce dans les limites de la variabilité de M. disjuncta, mais il ne m'est pas permis, pour le moment, d'anticiper sur le résultat possible de recherches futures.*" In the male of *M. paradisjuncta* he illustrated two postamphidial setae; hence such may be presumed to have been present in specimens of *M. disjuncta* previously described by de Coninck and Schuurmans Stekhoven (1933). Our researches do show that the apophyses of gubernaculum in *M. disjuncta* vary in degree of development, but we have not seen specimens with three poststomatal denticles; consequently, *M. paradisjuncta* is not synonymized in this article. It seems unfortunate that taxonomy is progressing to the place where such minute structures may be used for specific differentiation in such variable groups. If the best of observers are unable to distinguish specific characters in a large part of their specimens, unless there are differences in behavior, the recognition of additional closely related species on morphologic grounds appears questionable. Fortunately, with the propagation of such organisms in culture, investigators now should be able to exchange living specimens before proposing new species. Such procedures will slow publication, but will minimize further extension of lists of synonyms, and the species eventually accepted will probably differ both in morphology and physiology. It may be that some of the species of *Monhystera* are not amenable to culture in the absence of algae; this in itself might be used as a character to support their separation on morphologic grounds. Steiner (1958) has suggested the use of the arrangement of oöcytes in the ovarian growth zone and the presence or absence of a progaster as possible morphologic characters for the separation of freshwater *vs.* marine *Monhystera*. Now, with a means of cultivation, the various species can be propagated to determine their range not only of morphological, but also of physiological variation. So far we have observed the tendency toward a progaster and the existence of several oöcytes at any given level of the gonad in *M. disjuncta*, which has been found to reproduce at temperatures from 14 to 28 degrees C. Other very

closely related species differing in some such major character as position of the vulva at 57.5–59.2 percent in *M. islandica* L. de Coninck, 1943 and at 64.3 percent in *M. praeuvulvata* C. A. Allgén, 1932, could be compared with one another. Those without major morphologic differences—hence further possible synonyms of *M. disjuncta*—namely, *M. paraambiguoides* C. A. Allgén, 1932, and *M. paraambigua* C. A. Allgén, 1933, could be compared as to behavior as well as variation in morphology. One well may doubt the validity of the two last-named species.

Micoletzky (1922, p. 642) listed *M. ocellata* O. von Linstow, 1876, *M. diplops* N. A. Cobb, 1898, and *M. demani* B. Hofmänner and R. Menzel, 1915 (*non* E. de Rouville, 1905) as synonyms of *M. stagnalis* H. C. Bastian, 1865. If this synonymy is correct, the genus *Monhystera* must be characterized as having a progaster in the sense used by Steiner (1958), for such is illustrated by Hofmänner and Menzel (1915), but finer details of the head, cephalic setae, stoma, and the existence of genital papillae are not noted. Genital and somatic setae are given by Micoletzky (1914). It seems unfortunate that T. Goodey (1951) chose to illustrate *M. vulgaris* J. G. de Man, 1880, rather than the type species *M. stagnalis* H. C. Bastian, 1865 since, in view of the fine distinctions on which genera are currently based, it is quite possible that, eventually, species with a wide postlabial dilation of the stoma, as illustrated by Goodey, may be separated generically from those without such an outpocketing, as illustrated for *M. stagnalis* by Micoletzky (1914) and Hofmänner and Menzel (1915).

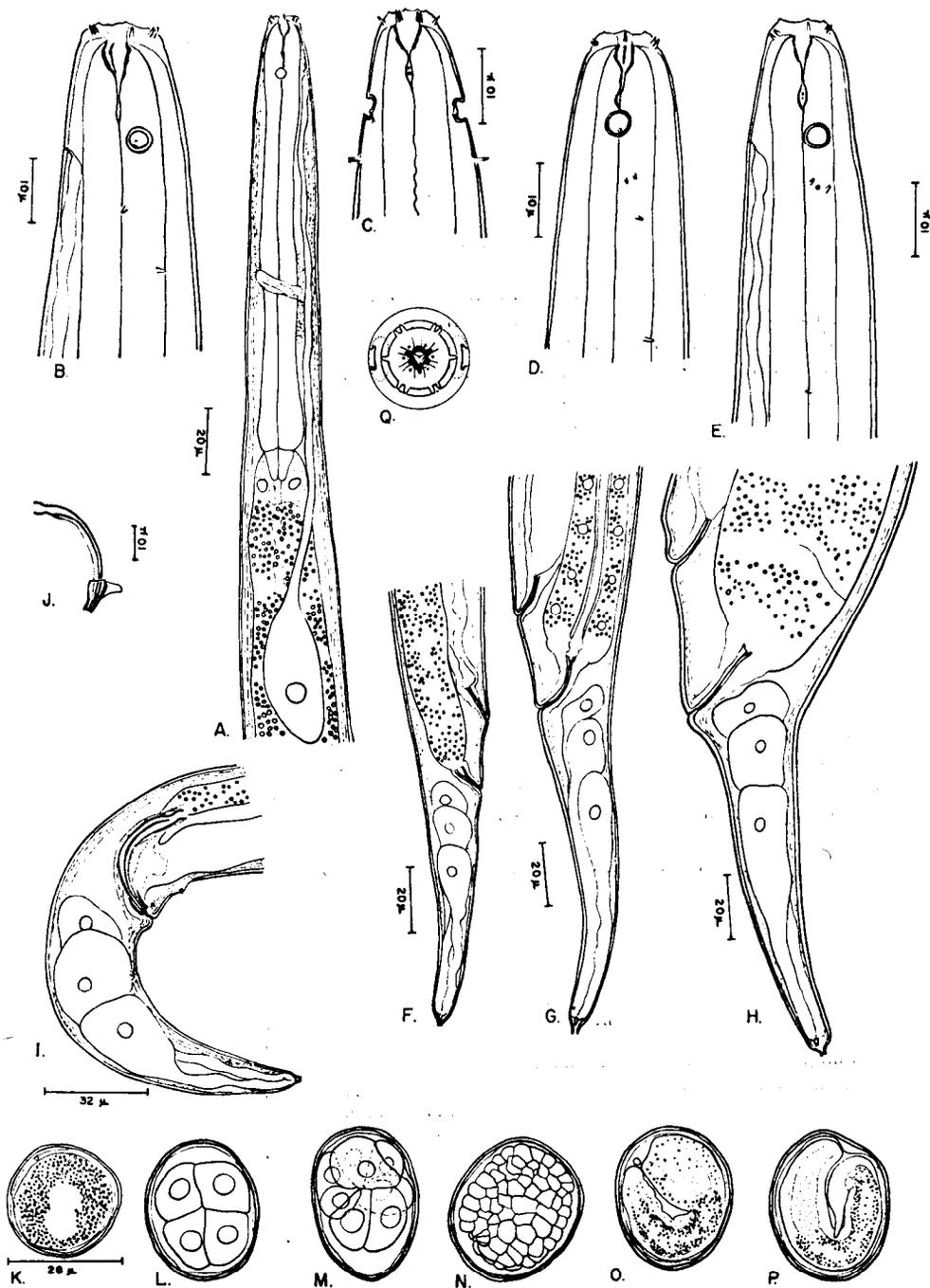


PLATE II. *Monhystra disjuncta*

- A. Esophageal region of females showing progaster and excretory cell;  
 B. Cephalic region of female, lateral view;  
 C. Same, ventral view;  
 D-E. Same of male showing variation in position of postamphidial setae;  
 F-H. Female posterior regions, lateral view, note variation in proportions;  
 I. Male tail, lateral view;  
 K-P. Eggs in progressive stages of development.