

The Diastylidae is a relatively large family (17 genera and over two hundred species, Băcescu 1992; now grown to 21 genera, Mühlenhardt-Siegel 2003) which is quite common in the NEP, especially in its Arctic and Boreal areas. Eight of these genera occur in the NEP, and are discussed below. A key to the genera in the family is provided by Jones (1969), but genera from couplet 16 on in that key are now considered to belong in the family Gynodiastylidae (see Day 1980). As one of three families bearing articulated telsons, its members are most often confused with members of the other two, Gynodiastylidae and Lampropidae. This confusion extends to even knowledgeable workers, with some describing lampropids as diastylids (see Gladfelter 1975). The family key provided in the first part of this series should allow appropriate allocation of specimens to families.

More of NEP diastylid species are described than was the case with the last family, the bodotriids. Of the 38 diastylids reported from the NEP, only 7 belong to provisional taxa. This is perhaps due to the relatively shallow distribution of bodotriids, into habitats frequently unsampled, while diastylids are commonly found further offshore where they can be easily taken by dredge, core, and trawl. The family also has more affinity for cold waters than does the Bodotriidae, with many of the NEP forms of only Arctic or boreal distribution. Lastly, diastylids tend to be larger than bodotriids, with some of the largest species of cumaceans in the family. At least some of the members can be brightly pigmented in life. *Anchicolurus occidentalis*, for instance, is pale pink with scarlet markings in fresh material (the color fading in preservation to bone white).

Sexual dimorphism in the diastylids is generally less pronounced than in the bodotriids, but still substantial. Again the males tend to have carapaces which are not inflated posteriorly, or are inflated less than in the female. Females are again larger than males.

NEP Diastylidae from McLaughlin et al (2005) augmented by known provisional taxa.  
\*= Taxa on the SCAMIT Ed 4 list + addenda. Valid taxa bolded, synonyms not.

#### Family Diastylidae

- \***Anchicolurus occidentalis** (Calman 1912) – Oregon to SCB; 13-64m  
Colourostylis (?) occidentalis see *Anchicolurus occidentalis*
- Diastylis abboti** Gladfelter 1975 – Dillon Beach; 13.5m
- Diastylis alaskensis** Calman 1912 – Japan to Puget Sound; 0-196m
- Diastylis aspera** Calman 1912 – Kuriles to Puget Sound; 95-1150m
- Diastylis bidentata** Calman 1912 – Arctic to Puget Sound; 9-1000m
- Diastylis calderoni** Donath-Hernández 1988 – Head of Gulf of California; 0-5m
- \***Diastylis californica** Zimmer 1936 – Humboldt Bay to So. Coronado Island;  
19-88m
- \***Diastylis crenellata** Watling and McCann 1997 – Fort Bragg to Coronado Sub-  
marine Canyon; 11-606m
- Diastylis dalli** Calman 1912 – Arctic to Puget Sound; 24-2350m
- Diastylis newberryi** Gerken 2005 – SCB to Baja California; 15-536m

- Diastylis nucella** Calman 1912 – Arctic to Puget Sound; shallow  
*Diastylis obfuscatus* see *Lamprops obfuscatus* in *Lampropidae*
- Diastylis paraspinulosa** Zimmer 1926 – Arctic to Puget Sound; 12-440m  
 \***Diastylis pellucida** J. F. L. Hart 1930 – Vancouver to SCB; 12-829m  
**Diastylis quadriplicata** Watling and McCann 1997 – Eureka to Gaviota; 123-366m  
**Diastylis rathkei** (Krøyer 1841) – Arctic to Puget Sound; shallow  
 \***Diastylis santamariensis** Watling and McCann 1997 – Puget Sound to San Diego; 6-204m  
 \***Diastylis sentosa** Watling and McCann 1997 – Puget Sound to San Diego; 41-500m  
*Diastylis triserrata* see *Lamprops triserrata* in *Lampropidae*
- Diastylis umatillensis** Lie 1971 – SE Alaska to Puget Sound; 20-60m  
**Diastylis sp BAP1** – Cadien 2001§ - Baja Abyssal Plain; 3880-3950m  
 \***Diastylis sp C** Myers & Benedict 1974§ - SCB; 197-576m  
**Diastylis sp CS1** Cadien 2004§ - Cascadia Slope; 1150-1372m  
**Diastylodes pacifica** Gerken 2005 – Baja California; 2385m  
**Diastylopsis dawsoni** S. I. Smith 1880 – Alaska to Pt. Conception; 2-35m  
 \***Diastylopsis tenuis** Zimmer 1936 – SCB; 3-60m  
 \***Leptostylis abditis** Watling and McCann 1997 – Central California to San Diego; 11-954m  
 \***Leptostylis calva** Watling and McCann 1997 – Fort Bragg to San Diego; 8-198m  
**Leptostylis villosa** G. O. Sars 1869 N. Atlantic, Puget Sound; 22-195m  
 \**Leptostylis* sp B see *Diastylis newberryi*  
*Leptostylis* sp CS1 see *Leptostylis* sp F  
**Leptostylis sp F** MBC 1985§ - Cascadia Slope and Abyssal Plain to Tanner Basin; 732-2800m  
**Makrokylindrus (Adiastylis) abyssi** Lomakina 1955 – NWP to Arctic; 3940m  
**Makrokylindrus (Adiastylis) americanus** Băcescu 1962 – Gulf of Panama; 1748m  
**Makrokylindrus (Adiastylis) menziesi** Băcescu 1962 - Galapagos; 3469-3493m  
**Makrokylindrus (Adiastylis) sp CS1** Cadien 2006§ - Cascadia Slope; 1372m  
**Makrokylindrus (Adiastylis) sp TB1** Cadien 2006§ - Tanner Basin; 1150+m  
**Makrokylindrus (Adiastylis) sp TB2** Cadien 2006§ - Tanner Basin; 1150+m  
 \***Oxyurostylis pacifica** Zimmer 1936 – SCB; 13-76m  
 \***Oxyurostylis tertia** Zimmer 1943 – San Diego to Baja California; 10m  
**Vemakylindrus costaricanus** Băcescu 1961 – Pacific Costa Rica; 3718m  
**Vemakylindrus hystricosa** Gerken 2002 – Monterey to Baja California; 1150-1880m  
*Vemakylindrus* sp TB1 see *Vemakylindrus hystricosa*

Since so many of the members of this family in the NEP are in the genus *Diastylis*, a separate key to those species will be presented later. Other NEP diastylids are keyed below to species. The species *Diastylis newberryi* serves to intergrade the genera *Diastylis* and *Leptostylis*, and is consequently keyed below among the *Leptostylis*, and

later in the *Diastylis* generic key as well. If you get to *Diastylis*, move to the key to that genus. More provisional species of *Diastylis* and/or *Makrokyllindrus* may be identified in samples from the Cascadia Abyssal Plain currently under evaluation.

Key to the known NEP Diastylidae (modified from Jones 1969) – dbcadien 31  
October 2006

- 1a. Mandibles broad at base, truncate basally.....*Diastylodes pacifica*
- 1b. Mandibles tapering to base, subacute basally.....2
- 2a. Telson lacking both lateral and terminal spines and/or setae (although ♂ has a pair of ventral setae at the end of the telson) .....*Anchicolurus occidentalis*
- 2b. Telson bearing either lateral or terminal (or both) spines and/or setae .....3
- 3a. Pseudorostrum as long as or longer than carapace.....*Vemakylindrus* 4
- 3b. Pseudorostrum much shorter than carapace.....5
- 4a. Pseudorostrum as long as remainder of carapace, horizontal; carapace covered with several sizes of large spines.....*Vemakylindrus hystricosa*
- 4b. Pseudorostrum longer than rest of carapace, upturned; carapace with a few small spines and many spinules.....*Vemakylindrus costaricanus*
- 5a. Thoracic somites 3 and 4 much wider basally than dorsally in both sexes (5-10X) .....*Diastylopsis* 6
- 5b. Thoracic somites 3 and 4 only 1-3x as broad basally as dorsally in both sexes.....7
- 6a. Thoracic sternite 5 with a pair of denticles or teeth.....*Diastylopsis dawsoni*
- 6b. Thoracic sternite 5 with a single denticle or tooth.....*Diastylopsis tenuis*
- 7a. Telson shorter than or equal to last abdominal somite in length .....8
- 7b. Telson at least 1.25 length of last abdominal somite.....11
- 8a. Outer ramus of uropod only about ½ length of inner.....*Leptostylis abditis*
- 8b. Outer and inner rami of uropod subequal.....9
- 9a. Female with rudimentary epipods on 3<sup>rd</sup> and 4<sup>th</sup> pereopod bases; males with well developed and evident pleopods for several molts; carapace smooth or variously setose, gray or tan, matte, not shiny.....10 (NOTE TRIPLET)
- 9b. Female completely lacking rudimentary epipods on 3<sup>rd</sup> and 4<sup>th</sup> pereopod bases; pleopods poorly developed in all but final male molt (2 reduced articles), carapace globular, smooth, translucent or white, shiny.....*Leptostylis sp F*
- 10a. Carapace with a few scattered setae.....*Leptostylis calva*
- 10b. Carapace quite hirsute.....*Leptostylis villosa*
- 10c. Carapace lacking setae.....*Diastylis newberryi* (see also in *Diastylis* key)
- 11a. Terminal spines lacking, telson tapers to sharp point.....*Oxyurostylis* 12
- 11b. Terminal spines present on telson.....13
- 12a. Carapace with row of small spinules along dorsal midline, along anterior dorsal border, and on ocular lobe.....*Oxyurostylis tertia*
- 12b. Carapace minutely villose, but lacking spinules along dorsal midline, along anterior dorsal border, or elsewhere.....*Oxyurostylis pacifica*
- 13a. Pre-anal telson elongate, tubular, generally much longer than post-anal portion; lateral setal pairs few or lacking, restricted to post-anal telson (pre-anal telson may bear lateral teeth or denticles however).....*Makrokyllindrus* 14
- 13b. Pre-anal telson not tubular; quadrate, subquadrate, or tapering; length generally

- shorter than post-anal portion, but occasionally equal to or longer; lateral telsonic setal pairs usually four or more, occasionally one or two; may extend to pre-anal telson, but generally on post-anal only.....*Diastylis*
- 14a. Post-anal portion of telson more than half length of pre-anal portion.....15
- 14b. Post-anal portion much less than ½ length of pre-anal portion.....17
- 15a. Post-anal telson distally patulous, bluntly rounded.....*Makrokylindrus abyssii*
- 15b. Post-anal telson distally tapering, pointed.....16
- 16a. Carapace with a curved serrate ridge extending from pseudorostrum to base; last thoracic and first abdominal somites lacking spines.....*Makrokylindrus* sp CS1
- 16b. Carapace lacking ridges; last thoracic and first abdominal somites bearing a pair of posterior (T5) or posteriodorsal (A1) spines..... *Makrokylindrus* sp TB2
- 17a. Basal 2/3 of pre-anal telson laterally dentate.....*Makrokylindrus menziesi*
- 17b. Pre-anal telson lacking lateral teeth.....18
- 18a. With strong denticles on ventral carapace margin between obsolete antennal sinus and posterior margin of carapace; a second row of strong teeth extending rearward and slightly down from the level of the pseudorostrum; a pair of small tubercles dorsally near tip of pseudorostrum.....*Makrokylindrus* sp TB1
- 18b. With strong denticles on ventral carapace margin from antennal sinus to postero-ventral corner of carapace, not extending onto posterior margin; only scattered small spinules elsewhere on carapace; no tubercles on pseudorostrum .....  
.....*Makrokylindrus americanus*

**Anchicolurus** – monotypic, containing only the local *A. occidentalis*. This is a large robust animal with heavily calcified carapace. It is readily recognized among other shallow water diastylids in the SCB by its prominent antero-ventral carapace corners, which give a quadricuspate frontal margin; and the enlarged pleura of the thoracic segments. No other diastylid occurring in the NEP has such a short telson, or one lacking any lateral spines or setae.

**Diastylis** – A large genus, largest in the family. Băcescu (1992) lists 84 species, to which the four species of Watling and McCann must be added along with additional more recent species (i.e. Gerken and Watling 1998). The description of *Diastylis newberryi* (Gerken 2005) complicated separation of *Diastylis* from *Leptostylis*. The species intergrades with *Leptostylis* in the structure of the telson, but is differentiated by the length of the antenna in the male, and by the lack of inflation in the peduncle of the male antennule which characterizes *Leptostylis*. In consequence, this animal is included in the above key to non-*Diastylis* members of the family, where it keys with members of the genus *Leptostylis*. It has also been included below in the key to the NEP *Diastylis*. A number of the forms reported from the NEP are only known from Arctic or boreal waters. None-the-less I provide below a key to the species known from the NEP, since no comprehensive key currently exists. Watling and McCann (1997) provide a key to some of the more common species of the genus from our area, but it is not comprehensive.

Key to known NEP species of *Diastylis* – dbcadien, 5 November 2006

- 1a. Carapace lacking ornamentation of either ridges or spines; smooth.....2
- 1b. Carapace ornamented with either ridges, spines, or a combination.....5
- 2a. Carapace with numerous setae, hirsute; eyelobes poorly defined.....3

- 2b. Carapace with few or no setae; eyelobes well defined.....4
- 3a. Eyelobe bear a pair of minute spinules; carapace minutely villose; ventral margin serrate, with large recurved pointed teeth; telson with 4 lateral setal pairs  
.....*Diastylis sp CS1*
- 3b. Eyelobe lacking spinules; carapace smooth, not minutely villose; ventral margin smooth, lacking large teeth; telson with 8-9 setal pairs.....*Diastylis umatillensis*
- 4a. Carapace lacking hump in carapace behind eyelobe and without sulcus around ocular lobe; post-anal telson shorter than pre-anal; one pair of lateral setae on telson.....*Diastylis newberryi*
- 4b. Carapace with eyelobe followed by a large hump, both set off by a sulcus similar to that of *Hemilamprops californicus*; post-anal telson longer than pre-anal; four pairs of lateral setae on telson.....*Diastylis sp C*
- 5a. Carapace ridges ending in large spurs.....*Diastylis calderoni*
- 5b. Carapace with either spines or ridges, but not both.....6
- 6a. Carapace with spines, but no ridges.....7 (NOTE TRIPLET)
- 6b. Carapace with ridges, but no spines.....8
- 7a. Spinules or small spines present on carapace along dorsal midline, but no large spines present; post anal telson much longer than pre-anal; lateral setal pairs numerous.....*Diastylis rathkei*
- 7b. Large spines present on carapace in one horizontal row; post anal telson much longer than pre-anal; lateral setal pairs numerous.....*Diastylis paraspinulosa*
- 7c. Large spines present on carapace in four horizontal rows; post anal telson equal to pre-anal; with four lateral setal pairs.....*Diastylis sentosa*
- 8a. Carapace with serrate, crenulate or castellate ridges.....9
- 8b. Carapace ridges smooth, lacking serrations, crenulations, or castellations.....13
- 9a. Pre-anal telson about ½ length of post anal.....*Diastylis nucella*
- 9b. Pre and post anal telson sections subequal in length.....10
- 10a. Carapace with a single ridge which is castellate anteriorly, but smooth posteriorly; telson very short, only about 1/3 of uropodal peduncle length; one lateral setal pair, or lateral setae lacking.....*Diastylis sp BAP1*
- 10b. Carapace with multiple ridges; telson ½ or more uropodal peduncle length; two or more pairs of lateral telsonic setae.....11
- 11a. Telson only about ½ length of uropodal peduncles in both sexes; bearing 2-6 pair of lateral setae.....12
- 11b. Telson subequal to uropodal peduncle in length; bearing about 9 pairs of lateral setae.....*Diastylis aspera*
- 12a. Three transverse ridges across carapace; ridges not separated by smooth sulci, all three ridges parallel, not anastomosing; telson with 5-6 pairs of lateral setae  
.....*Diastylis pellucida*
- 12b. Carapace with two ridges which join behind and below the anterior lobe of the carapace; the anterior ridge runs transversely across the carapace; the posterior ridge is separated into curving sections on either side of the dorsal midline which extend posteriorly at the start then downward and back forward to join the anterior ridge; where they join, the posterior ridge bifurcates and its ventral branch meets the ventral margin; between the two ridges dorsally are crescentic sulci on both sides of the carapace midline; telson with 2-4 lateral setal pairs

- .....*Diastylis crenellata*
- 13a. At least one ridge bearing a tooth on each side of the carapace.....14
- 13b. No teeth on carapace ridges.....15
- 14a. One tooth on the second carapace ridge; post-anal telson nearly three times length of pre-anal part; 10 lateral telsonic setal pairs.....*Diastylis bidentata*
- 14b. Two teeth on the first carapace ridge, one lateral to the frontal lobe, and a second above the frontal lobe; pre-anal telson longer than post-anal; 4-5 lateral telsonic setal pairs.....*Diastylis californica*
- 15a. Pre and post-anal portions of telson subequal.....16
- 15b. Post-anal portion of telson longer than pre-anal.....18
- 16a. Telson and uropodal peduncle subequal in length.....17
- 16b. Uropodal peduncle 1/3 longer than telson.....*Diastylis alaskensis*
- 17a. Oblique carapace ridges reaching the ventral margin; telson with 2-3 setal pairs laterally.....*Diastylis abbotti*
- 17b. Oblique carapace ridges extend forward at the base, not reaching ventral margin; telson with 6 setal pairs laterally.....*Diastylis quadruplicata*
- 18a. Post-anal telson twice the length of pre-anal; 8-9 lateral setal pairs on telson; the carapace ridges not anastomosing into polygons mid-dorsally.....*Diastylis dalli*
- 18b. Post-anal telson 1 1/2 times the length of pre-anal; 5 lateral setal pairs on telson; carapace ridges forming polygons mid-dorsally.....*Diastylis santamariensis*

**Diastylloides** – A small genus of seven described species worldwide (Băcescu 1992) to which an eighth must now be added (Gerken 2005). The only species known from the NEP is the newly described *D. pacificus*, from deep-water off Baja California. Reyss (1974) provides a key to the genus except for *D. pacificus*. *Diastylloides pacificus* is most similar to *D. atlanticus* (Gerken 2005) and should key with that species in Reyss' key.

**Diastylopsis** – The genus is easy to recognize because of its long cylindrical carapace. It occurs in relatively shallow sands, but in some areas has been reported as deep as 60m. This seems rather atypical, but the members of the genus cannot be confused with any other present in the NEP, and so these deep records are regrettably and suspiciously accepted. There seems to be a good separation between the two taxa which occur in the area, with *D. dawsoni* occurring north of Pt. Conception, and *D. tenuis* occurring south of that biogeographic divider in the SCB. There is some overlap, however, and specimens taken in the area bounded by Pt. Conception and Morro Bay should be carefully examined; *D. tenuis* does occasionally occur there. I know of no substantiated reports of *D. dawsoni* within the SCB, however. Barnard and Given (1962) state that they had been unable to find intergradation (I assume this to mean hybridization) between the two taxa, despite examination of a great deal of material. They illustrate the male of *D. tenuis*, which was not known to Zimmer when he described the species (Zimmer 1936). The two species can be distinguished by their sternal tooth formulae (ventral teeth on thoracic and abdominal somites). In males it is T2 (1), T3 (1), T4 (0), T5 (1), A1 (1), A2 (1), A3 (0) for *D. tenuis* and T2 (0), T3 (0), T4 (0), T5 (2), A1 (1), A2 (1), A3 (1) in *D. dawsoni*. For females the formulae are T5(1), A1(0) in *D. tenuis* vs. T5(2), A1 (1) in *D. dawsoni*.

**Leptostylis** – As discussed by several authors (i.e. Day 1980, Gerken 2005, Gerken and Watling 1998, Watling and McCann 1997) the genus tends to intergrade with *Diastylis* and *Makrokylindrus*. Previous seemingly clear distinctions in telson structure are now blurred, so that determination of *Leptostylis* is no longer straightforward. Problems continue to make themselves apparent. With the provisional *Leptostylis sp F* for instance, the males do not bear pleopod primordia until they are in the pre-reproductive molt, and then they are rudimentary (only two small articles). No males with fully developed pleopods have yet been found, but one which shows the rudiments of two pleopods is known from the Tanner Basin. As is often the case, the problem did not appear until sufficient material was available for full characterization of the taxon. Since the pleopods are so little developed, sexing the animals depends on the count of epipods on the pereopods: 1-4 in the male, and 1-2 in the female. It is possible that this species never fully develops setose pleopods in the male; we will keep looking for additional material to answer that question. Day (1980) used male pleopod number as a distinguishing factor in the separation of the Diastylidae and Gynodiastylidae. She defined the Gynodiastylidae as lacking pleopods in the male, and the Diastylidae as bearing two pleopods in the male. Difficulty with male pleopods was already apparent in the description of *Atlantistylis* by Reyss (1975), a genus lacking pleopods in the male, but retained in the Diastylidae by Day (1980) without comment on the disparity. It has recently led to erection of new genera of diastylids similar to *Leptostylis*, but with a single pleopod in the adult male (*Ektonodiastylis*, Gerken et al 2000; *Divastylis*, Mühlenhardt-Siegel 2003).

**Makrokylindrus** – Six representatives of this genus are found in the NEP, two provisionals from the Tanner Basin, one from the Cascadia Slope; two described species from considerably to the south, in deep-water of the Gulf of Panama and off the Galapagos (Băcescu 1962), and one in Bering Sea waters (see Lomakina 1958), all in the sub-genus *Adiastylis*. Members of the subgenus *Makrokylindrus* ss occurs sparingly (3 spp.) in the NW Pacific, but is absent in the Eastern Pacific. Members of the subgenus *Adiastylis* are also present, and diverse, in the NW Pacific (6 species). The genus, including both subgenera, is distributed world-wide, with many representatives in the Atlantic, Indian, and Pacific Oceans, and a few in the polar seas. Băcescu (1992) lists 15 species in *Makrokylindrus* ss., and 40 in *Adiastylis*, but this number has certainly increased in recent years (i.e. Mühlenhardt-Siegel 1997). It is best separated from *Diastylis* by the relative lengths of the pre and post anal sections of the telson, but there is a tendency for this to intergrade in some forms.

**Oxyurostylis** – Băcescu (1992) lists only five species in the genus, and no additional ones have been described since. Two of these species occur in the NEP. The record of *Oxyurostylis sp.* (J. L. Barnard (1970) represent undeterminable specimens, since both *O. pacifica* and *O. tertia* were reported from the collections. Specimens of *O. tertia* are unlikely to occur much to the north of San Diego, although that remains a possibility during ENSO events with strong northward warm current flow. All *Oxyurostylis* are shallow water animals, and the 76m record for *O. pacifica* is unusual, most specimens being taken shallower. They frequent bays and estuaries, and were common components of several associations the benthos in Bahia San Quintin (J. L. Barnard 1970)

**Vemakylindrus** – Ten species in this genus were listed by Băcescu (1992), to which *V. hystricosa* Gerken 2002 must be added. A juvenile specimen of this species was taken in the Tanner Basin at around 1150m. While this initially appeared separable, the differences were, on further reflection, ascribed to ontogenic change, and the erected provisional was synonymized with *V. hystricosa*. Members of this genus seem to be very uncommon locally, with only five specimens known from California, three of them manca. No material identifiable as *Vemakylindrus* was recorded from the bathyal-abyssal collections made in the Gulf of the Farallones near San Francisco, and none has yet been located in materials from bathyal and abyssal depths off Oregon. Similarly the two species described from deep tropical waters in the Eastern Pacific (Băcescu, 1961) are known from a total of three specimens.

Additional References (see Part 1 for Main reference list)

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