

Opisthobranch Newsletter

December, 1998 -- 24(12):51

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EDITOR'S NOTES

The ON was started in 1969 and something over 250 issues have been published over the past 30 years.

Subscriptions for 1999 are now due. The subscription rate is still \$20 per year as it has been since the 1970's. Send cash or checks in any currency -- I cannot accept credit cards and bank electronic transfers cost me at least \$10.00 each.

Most of the additions to the database will be included here so that those of you who are not on computers can use them. The basic bibliographic file is about 3 megabytes in size and does not transfer or print out well.

READER FORUM

The records of *Dendronotus frondosus* from the littoral pools of Bering Island (Commander Islands).

Irina S. Roginskaya, P.P. Shirshov Institute of Oceanology, Moscow, Russia.

Dendronotus frondosus (Ascanius, 1774) has a wide distribution in the northern Atlantic and Pacific Oceans and in the whole Arctic area (MacGinitie, 1959; Robilliard, 1970). The southern limits of *D. frondosus* are French coasts (Arcachon), Cape Cod (U.S. Atlantic coast) (Marcus, 1961), Sado Island (Japan) (Baba, 1993), and Qingdao (China) (Tchang Si, 1931). This species is one of the most common nudibranch species of the White Sea and Barents Sea, especially in littoral and sublittoral environments. *D. frondosus* is locally abundant all year round in the vicinity of the White Sea Biological Station of Moscow State University (Kandalaksha Bay) (Roginskaya, 1987).

During my survey of Commander Islands' nudibranch fauna in August 1971 and in September-October 1972 *D. frondosus* proved to be practically absent in the intertidal zone of Bering Island (55°00'N, 166°15'E). In August 1971 all my efforts to find either the adults of *D. frondosus* or the characteristic egg-masses of this species were in vain. In September-October 1972 this species had been found only twice. Both findings were confined to the brown alga *Thalassiophyllum clathrus* (Gmel.) Post. and Rup., from the sublittoral tidepools, numerous on the rocky platforms near the settlement Nikolskoye. The rough perforated blades, stems and rhizoids of *T. clathrus* harbored rich epibioses. Diverse

species of nudibranchs were also abundant on living substrata overgrowing this laminarian: on hydroids, sea anemones, sponges, branching and encrusting bryozoans etc. (Roginskaya, 1979).

In the 23 September 1972 sample from the tidepool with *T. clathrus* (water temperature at low tide = 11.0°C) only the mutilated fragment of the anterior part of the body of *D. frondosus* was discovered, though not only with intact buccal complex, but also with one pair of arborescent dorsal papillae. There were 34 rows of teeth in the tapering radula. The radular formula was 34 x 6.1.6. The yellowish robust median teeth, with prominent pointed central cusp, flanked by 14-15 sharp denticles on the side (Plate 1,1,2), and the elongated translucent laterals, bearing 5-7 sharp denticles (except the external smooth tooth in each half-row), were typical for the species. Also typical, the rather large jaws were horny yellow with the exception of dark brown hinge parts and masticatory processes, armed with more than 50 irregularly split denticles (Plate 1,3).

Two weeks later, on 4 October 1972, the small specimen of *D. frondosus*, 10.2mm long alive, was obtained, from the tidepool (water temperature = 6.0°C). This animal was actively crawling on the "leaves" of *T. clathrus*, in company with some other nudibranchs: numerous *Cuthona* sp., two specimens of *Acanthodoris pilosa*, one ragged exemplar of *Coryphella athadona* (with its spawn), one specimen of *Doto* sp. etc. The ground color of the body was translucent white, marbled with dark brown blots, minute on the sides, large and often fused on the back. Numerous golden-yellow points and broken lines were scattered over the whole body. Five pairs of fan-shaped branched dorsal cerata were arranged on the back, and there were two unpaired small papillae on the long pointed tail. Each rhinophoral sheath had arborescent processes on the edge and a long branching lateral papilla near the base. There were 5 pairs of slightly branched processes on the oral veil: one median pair, the largest and the stoutest, and two pairs of short papillae on the right and on the left sides from the medians. The anal papilla was situated between the bases of the first and the second right cerata; the genital apertures - on the right side, anterior to the first row of cerata. The radular teeth (Plate 1,4,5) and the broad, brown-yellowish, translucent mandibles with dark brown hinge parts and denticulated masticatory processes were typical for the species. The radular formula was 29 x 8.1.8.

According to the information of E.F. Gurjanova (1935), who conducted hydrobiological investigations around Bering Island during nine months of 1932, nudibranchs appeared in the intertidal zone of Commander Islands in the middle of March, their number increased up to June-July, when abundance reached its peak, and then these molluscs completely disappeared in August. So I was prepared for a low probability of successful samplings.

But, during my sojourn at Commander Islands (about forty years later), in August 1971 and September-

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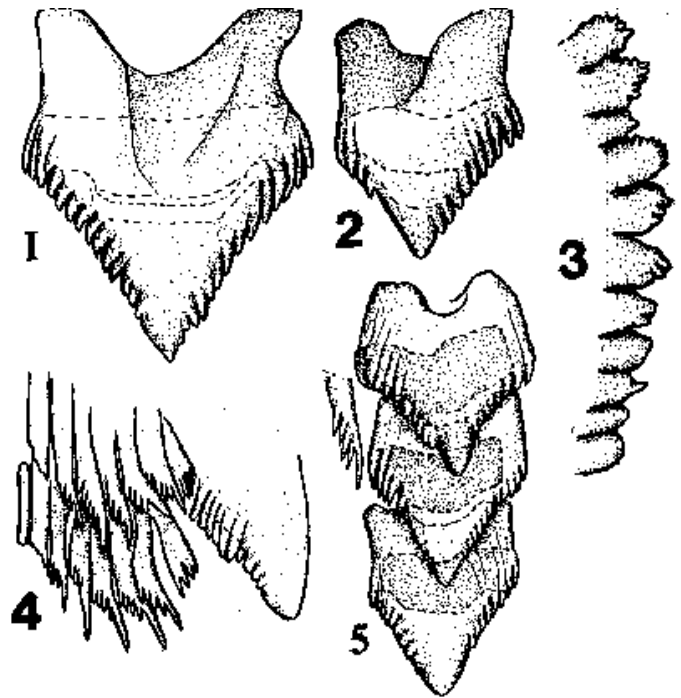
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October 1972, more than 10 species of nudibranchs were taken in diverse localities along the coasts of Bering Island (Roginskaya, 1972), and some (apart from *D. frondosus*) - even in relatively high densities, especially *Coryphella athadona*, *Aeolidia papillosa*, *Acanthodoris pilosa* and *Onchidoris muricata*. The absence of *D. frondosus* could reflect some internal physiological characteristics of this species. According to Lemche (1941) this north-circumpolar species, restricted to north temperate and arctic seas, being eurytherm in vegetative period, could propagate only at temperatures about or slightly above zero, prospering even under constant negative temperatures. So it was not strange if this species in some critical periods of the life cycle (like breeding and metamorphosis) might be simply unable to tolerate the constant, rather high temperatures in the intertidal zone of Commander Islands, where fauna and flora of boreal type flourish.

But, in fact *D. frondosus* couldn't be attributed to strictly cold-stenotherm species in spawning period as well (unless different authors were dealing with different subspecies or physiological races). In 1961 Marcus indicated that from the distribution of this species, "it seems evident that *D. frondosus* can spawn successfully at higher temperatures." And, in the arctic White Sea, where *D. frondosus* has at least six cold months at choice for propagation, this species selects for spawning, late spring and summer. The mass mating and egg-laying of *D. frondosus* in the intertidal zone of the White Sea (at the White Sea Biological Station of Moscow State University (66° 33'N)) was observed, beginning from the end of May (Roginskaya, 1987), when the water temperature already attained as high as 10-13°C. During unusually warm summers the numerous egg-masses of *D. frondosus* with normally developing embryos were observed throughout the most warm period (for instance, in June 1960), when water temperature raised up to 16.5-22.0°C. The normal egg-masses were produced by this species in the field also in October, when water temperature in the littoral zone did not exceed 3°C. The new generation of *D. frondosus* usually appears in the littoral zone already in July-August.

And the records of *D. frondosus* as far south as Qingdao (China) (Tchang Si, 1934), with spawn observed not only in winter, but also in spring (April), also point out on the eurythermy of the species. So the temperature could not put obstacles in the appearance of young offspring at the Bering Island in August - October. Though it is possible that like in Northwest Atlantic (Clark, 1975) the settling of veligers of *D. frondosus* occurs far from the locations where they were hatched. But, it seems to me, that the most possible explanation for the absence of *D. frondosus* in the littoral zone of Commander Islands in late summer and in autumn can

be the post-spawning death of adults, (or their post-spawning subtidal migration) and following larval settlement and nursery existence in more calm deeper waters, far from the unstable intertidal environment of Commander Islands opened to wild surfs, linked with often hurricane winds.



Explanation of Plate 1.

1-3 - specimen of *Dendronotus frondosus* found 23.09.1972: 1 - the median tooth from the 4-th row from the new end of the radula; 2 - the median tooth from the oldest row of the radula; 3 - enlarged fragment of the cutting edge of the masticatory processes of the jaw. 4-5 - specimen of *D. frondosus* found 04.10.1972: 4 - median and lateral teeth of the 5-6-th rows from the old end of the radula; 5 - median teeth of 13-15th rows from the old end of the radula.

It is likely that the two specimens of *D. frondosus* found in autumn 1972 were not full grown. The single live specimen had the body length only 10.2mm. The body length of live adults of *D. frondosus* in the White Sea could reach as long as 45mm (Roginskaya, 1987), the body length of the specimens from Japan (Baba, 1993) reached 15-20mm alive; after Swennen (1961) the animals from Netherlands could attain 98mm of length, and the specimens from Point Barrow - 95-115mm (MacGinitie, 1959). It appears the process of migration of the young specimens, hatched from the spawn, produced in early spring, back to the littoral zone of Bering Island starts in autumn. And the two specimens found by me in the tidepools could be interpreted as the pioneers of this process. But they also could be accidentally washed ashore by surf.

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PERSONAL NOTES

From Erwin Köhler: I'm at Bohol, Philippines, back to Germany on November 30th. [ed., I suspect that Erwin will have a large number of new opisthobranch photos to add to his web site over the next weeks.]

My name is Dmitry Redkin, I'm a student of St.-Petersburg State University. My specialization is zoology of invertebrates and I'm greatly interested in the ecology of Nudibranchia. At the same time I have some problems in getting information on the subject. That's why I would like to meet people working in this field. My e-mail address is d_redkin@hotmail.com

From Cynthia D. Trowbridge: After two years working in Scotland, I have now returned to Oregon State University where I am a Research Assistant Professor. In October, I went to Puerto Peñasco, Mexico as a visiting instructor with a field biology course from University of Texas - El Paso. In January and February, I will be working in Australia on a CSIRO contract, and visiting opisthobranch colleagues. Please note my new address. - Hatfield Marine Science Center, Oregon State University, Newport, OR 97365, USA
trowbric@bcc.orst.edu

From Jessica Beaubier: I am an undergraduate biology student at the University of Victoria in British Columbia. As part of my invertebrates course I have to research and prepare a report on *Haminoea virescens* (Sowerby 1833), the green paper bubble. Unfortunately, I've been unable to find much beyond a basic

morphological description of the species, even though I've searched through the ... library and spoken with the mollusc Dr. at Uvic! I was hoping that perhaps [a reader] could offer some information on this species' biology (feeding, reproductions etc.) or perhaps some appropriate references. - jessicab@uvic.ca

INFORMATION

I have a question about nudibranchiate dispersion based on many observations when diving and collecting nudibranchs here in the coastline of middle Norway. Is there any information about adult specimens dispersing by "planctonic behavior"? I have on many occasions observed *Polycera quadrilineata* drifting by when ascending from a dive. It seemed like they were drifting up-side down. When disturbing their floating around they would in many cases "fall down" towards the bottom, but only when disturbing the part pointing to the surface. It could seem like they had a mucous string from which they were hanging from. This behavior has puzzled me a lot, since I have not yet read about this kind of thing with nudibranchs. I could in many cases also observe other bottom-dwelling gastropods like *Lacuna* sp. also floating by. - jussie@stud.ntnu.no

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viridis*, *Embletonia mariae*, *Eubranchius exiguus*, *Eubranchius olivaceus*, *Euselene luniceps*, *Facelina annulicornis*, *Facelina auriculata*, *Facelina auriculata coronata*, *Favorinus branchialis*, *Fiona pinnata*, *Freyeria*, *Gastropteron pacificum*, *Glaucilla marginata*, *Glaucus atlantica*, *Gleba*, *Gonieolis*, *Goniodoris nodosa*, *Gymnodoris*, *Halgerda*, *Hallaxa*, *Haminea brevis*, *Haminea cymbalum*, *Haminea hydatis*, *Haminea navicula*, *Haminea virescens*, *Haminea zelandica*, *Haminea*, *Hancockia burni*, *Hedyle spiculifera*, *Hedylopsis brambelli*, *Hedylopsis loricata*, *Hedylopsis spiculifera*, *Hedylopsis suecica*, *Hermaea (Hermaea) bifida*, *Hermaea (Hermaea) variopicta*, *Hermaea (Placida) dendritica*, *Hermania catena*, *Hermania scabra*, *Hermania venosa*, *Hermisenda crassicornis*, *Hero formosa*, *Herviella*, *Heterodoris*, *Hexabranchius sanguineus*, *Hoplodoris*, *Homoiodoris*, *Hopkinsia*, *Hydatina physis*, *Hypselodoris infucata*, *Ildica*, *Jorunna tomentosa*, *Julia japonica*, *Kalinga ornata*, *Kentrodoris*, *Laginiopsis*, *Laila cockerelli*, *Lamellaria membranacea*, *Lamellaria perspicua*, *Laplysia depilans*, *Laplysia viridis*, *Limacia*, *Limapontia capita*, *Limapontia depressa*, *Limapontia nigra*, *Limapontia senestra*, *Limapontia senestra corrugata*, *Linguella*, *Lobiger serraldifalci*, *Lomanotus marmoratus*, *Madrella sanguinea*, *Marianina*, *Marionia pustulosa*, *Maxaetion cratericulatus*, *Melibe leonina*, *Miamira*, *Microhedyle lactea*, *Micromelo guamensis*, *Mordilla*, *Myrrhine*, *Navanax inermis*, *Nembrotha eliora*, *Nossis*, *Notarchus punctatus*, *Notarchus timidus*, *Notaeolidia*, *Notobranchaea*, *Notodiaphana*, *Notodoris*, *Odostomia columbianus*, *Odostomia fujitanii*, *Odostomia modesta*, *Odostomia rufa*, *Odostomia unidentata*, *Okadaia elegans*, *Okenia*, *Olea hansineensis*, *Onchidoris bilamellata*, *Onchidoris muricata*, *Oscania tuberculatus*, *Ossiania alata*, *Ossiania angulata*, *Ossiania nitida*, *Ossiania quadrata*, *Oxyne*, *Pelta coronata*, *Peltodoris atromaculata*, *Peracle*, *Peraclis*, *Phanerophthalmus smaragdinus*, *Phestilla melanobranchia*, *Phidiana pugna*, *Philine angulata*, *Philine aperta*, *Philine auriformis*, *Philine catena*, *Philine nitida*, *Philine pruinosa*, *Philine punctata*, *Philine quadrata*, *Philine quadripartita*, *Philine scabra*, *Philine scutulum*, *Philinoglossa helgolandica*, *Philinoglossa remanei*, *Phillinopsis pilsbryi*, *Phillinopsis taronga*, *Phyllaplysia taylori*, *Phyllidia varicosa*, *Phylliroe bucephala*, *Phyllobranchius orientalis*, *Phylloidesmium*, *Placida viridis*, *Placobranchus*, *Platydorid*, *Pleurobranchaea*, *Pleurobranchus plebranceus*, *Pleurobranchus peroni*, *Pleurobranchus tuberculatus*, *Plocamopherus ceylonicus*, *Plocamopherus imperialis*, *Pluscula*, *Pneumoderma*, *Pneumoderopsis*, *Polybranchia*, *Polycera atra*, *Polycera capensis*, *Polycera quadrilineata*, *Precuthona*, *Proctonotus*, *Procybullia*, *Protaeolidiella*, *Pseudovermis mortoni*, *Pteraeolidia semperi*, *Pupa kirki*, *Pupa sulcata*, *Pyramidella*, *Retusa mamillata*, *Retusa obtusa*, *Retusa obtusa pertenuis*, *Retusa operculata*, *Retusa plicata*, *Retusa retusa*, *Retusa truncatula*, *Retusa truncatula mammillata*, *Retusa umbilicata*, *Rhizorus acuminatus*, *Rhizorus acuminatus brevis*, *Rhizorus adelaidis*, *Ringicula*, *Rostanga arbutus*, *Roxania utriculus*, *Roxania utriculus cranchii*, *Runcina calaritana*, *Runcina coronata*, *Runcina hancocki*, *Runcina setoensis*, *Runnica*, *Sagaminopteron ornatum*, *Scaphander librarius*, *Scaphander lignarius*, *Scaphander punctostriatus*, *Sclerodoris*, *Scyllaea pelagica*, *Spiratella helicina*, *Spiratella retroversa*, *Spongiobranchaea*, *Spurilla neapolitana*, *Stiliger bellulus*, *Stiliger fuscatus*, *Stiliger gopalai*, *Stiliger modestus*, *Stiliger ornatus*, *Stiliger vesiculosus*, *Styliola*, *Tenellia pallida*, *Tenellia (= Embletonia) pallida*, *Tergipes despectus*, *Tethys leporina*, *Thecacera*, *Thliptodon*, *Tochuina tetraquetra*, *Tornatella fasciata*, *Tornatina mamillata*, *Tornatina nitidula*, *Tornatina truncatula*, *Trapania*, *Tricla lignaria*, *Tricla punctostriata*, *Tridachia crispata*, *Trinchesia aurantia*, *Trinchesia caerulea*, *Trinchesia glottensis*, *Trinchesia pilata*, *Triopha carpenteri*, *Trippa*, *Tritonia diomedea*, *Tritonia festiva*, *Tritonia hombergi*, *Tritonia plebeia*, *Turbonilla*, *Tyrodina*, *Umbraculum sinicum*, *Vayssierea caledonica*, *Volvaria subcylindrica*, *Volvatella*, *Volvula acuminata*, *Volvula sulcata*]
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