

Opisthobranch Newsletter

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EDITOR'S NOTES

I want to establish a file of links to M-PEG videos of seaslugs. If they are too large for your server, send them to me and I will host them on seaslug.com I am also hoping to put together a file of radula illustrations. Send your links. If someone wants to step forward to prepare and present these I would welcome the help.

My apology for the poor attempt to mass e-mail the March ON to the listserver group. It was too big and choked the listserver. This month I will send you an address to view the issue.

INFORMATION WANTED

From Wolfgang Seifarth: I am currently in the progress of updating my web page on "Marine Flatworms of the World!" and I considered it a good idea to ask the readers of ON for photos and information about polyclad flatworms (Encountering polyclad flatworms must be quite common when looking for seaslugs in the field?!). I will be very glad about any contribution of polyclad flatworm photos, which will be presented with name of author, copyright and whatever info the author would like to be included (link to homepage). For further information check out the "Marine Flatworms of the World!" at <http://www.rzuser.uni-heidelberg.de/~bu6/index.html>, Email to: seifarth@rumms.uni-mannheim.de

BOOK REVIEW

Julie Marshall and Richard Willan, 1999. Nudibranchs of Heron Island, Great Barrier Reef. A Survey of the Opisthobranchia (Sea Slugs) of Heron and Wistari Reefs. Backhuys Publishers, Leiden 268pp., 2 text figs, 41 color plates, hardbound, ISBN 90-5782-033-1, NLG 120.00/US\$ 60.00.

This is a great book. The content is current and complete. The presentation is excellent with good binding and typography. Each species is presented in systematic order with family name, specific name, author, date, illustration number, description, habitat, abundance, depth range, size, geographic distribution, synonyms, and references. The index and the bibliography are comprehensive. The systematic checklist is very useful. No doubt there will be arguments over the placement of taxa but those arguments will always be with us. I suspect there will be fewer generated here than by most works.

This book provides another good section of material on the world's opisthobranch species. At least 468 species are

listed in the book, including 51 undescribed species illustrated in color among the 280 species pictured. This book belongs with your library for opisthobranch identification.

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Marshall, Julie G.; Willan, Richard C. 1999. Nudibranchs of Heron Island, Great Barrier Reef. A Survey of the Opisthobranchia (Sea Slugs) of Heron and Wistari Reefs. Backhuys Publishers, PO Box 321, 2300 AH Leiden, The Netherlands x + 257p.; 290 cl. figs.; 2 grph.; 215 x 303mm; hardback with clr photos. [ISBN 90-5782-033-1; US\$60.00; 51 undescribed species in color; 468 species listed. *Actinocyclus japonicus*, *Adamnestia arachis*, *Aegires* cf. *punctilucens*, *Aegires citrinus*, *Aegires villosus*, *Aeolidia* sp 1., *Aeolidiella alba*, *Aeolidiella indica*, *Aeolidiopsis ransonii*, *Aglaja orientalis*, *Akera soluta*, *Aldisa* sp. 1, *Analogium amakusanum*, *Analogium striatum*, *Aplysia dactylomela*, *Aplysia extraordinaria*, *Aplysia oculifera*, *Aplysia parvula*, *Aplysia sowerbyi*, *Ardeadoris egretta*, *Armina cygnea*, *Ascobulla fischeri*, *Ascobulla pusilla*, *Asteronotus cespitosus*, *Atys cheverti*, *Atys cylindricus*, *Atys darnleyensis*, *Atys debilis*, *Atys densus*, *Atys naucum*, *Atys semistriatus*, *Atys tortuosus*, *Baeolidia harriettae*, *Berghia amakusana*, *Berghia major*, *Berthellinia corallensis*, *Berthella martensi*, *Berthella stellata*, *Berthellina citrina*, *Bornella adamsii*, *Bornella anguilla*, *Bornella stellifer*, *Bulla adamsi*, *Bulla ampulla*, *Bulla punctulata*, *Bulla vernicosa*, *Bullaria adamsi*, *Bursatella leachii*, *Cadlinella ornaticissima*, *Carminodoris nodulosa*, *Cavolina gibbosa*, *Cavolina globulosa*, *Cavolina inflexa*, *Cavolina tridentata*, *Cavolina uncinata*, *Ceratosoma alleni*, *Ceratosoma gracillimum*, *Ceratosoma moloch*, *Ceratosoma trilobatum*, *Cerberilla affinis*, *Chelidonura amoena*, *Chelidonura electra*, *Chelidonura fulvipunctata*, *Chelidonura hirundinina*, *Chelidonura inornata*, *Chelidonura pallida*, *Chelidonura tsurugensis*, *Chromodoris* aff. *africana*, *Chromodoris albopunctata*, *Chromodoris aspersa*, *Chromodoris aureopurpurea*, *Chromodoris burni*, *Chromodoris* cf. *roboi*, *Chromodoris coi*, *Chromodoris daphne*, *Chromodoris decora*, *Chromodoris elisabethina*, *Chromodoris fidelis*, *Chromodoris geometrica*, *Chromodoris kuiteri*, *Chromodoris kuniei*, *Chromodoris leopardus*, *Chromodoris lineolata*, *Chromodoris lochi*, *Chromodoris magnifica*, *Chromodoris preciosa*, *Chromodoris rubrocornuta*, *Chromodoris rufomaculata*, *Chromodoris* sp. 1, *Chromodoris* sp. 2, *Chromodoris splendida*, *Chromodoris striatella*, *Chromodoris tinctoria*, *Chromodoris verrieri*, *Clio convexa*, *Clio cuspidata*, *Clio pyramidata*, *Cliopsis krohni*, *Corolla ovata*, *Cratena affinis*, *Cratena* cf. *affinis*, *Cratena lineata*, *Cratena simba*, *Creseis acicula*, *Creseis chierchiae*, *Creseis virgula*, *Crimora lutea*, *Cuthona acinosa*, *Cuthona* cf. *ornata*, *Cuthona kanga*, *Cuthona sibogae*, *Cuthona* sp. 1, *Cuthona* sp. 2, *Cuthona* sp. 3, *Cuthona* sp. 4, *Cuthona* sp. 5, *Cuthona* sp. 6, *Cuvierina columnella*, *Cyerce* cf. *pavonina*, *Cyerce elegans*, *Cyerce kikutarobabai*, *Cyerce nigra*, *Cyerce nigricans*, *Cyerce* sp. 1, *Cylichna collyria*, *Cylichna crispula*, *Cylichna nitida*, *Cymbulia sibogae*, *Dendrodoris albobrunnea*, *Dendrodoris atromaculata*, *Dendrodoris coronata*, *Dendrodoris denisoni*, *Dendrodoris fumata*, *Dendrodoris guttata*, *Dendrodoris nigra*, *Dendrodoris rainfordi*, *Dendrodoris tuberculosa*, *Dermatobranchus* cf. *nigropunctatus*, *Dermatobranchus fortunata*, *Dermatobranchus ornatus*, *Desmopteris papilio*, *Diacavolinia longirostris*, *Diacria danae*, *Diacria quadridentata*, *Diacria rampali*, *Diacria trispinosa*, *Diniatys dentiferus*, *Diniatys monodontus*, *Discodoris* cf. *mauritanica*, *Discodoris fragilis*, *Discodoris palma*,

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Ecophenotypical variation: Morphological differences may occur because of ecological conditions. Several factors of the physical environment - whether such animals grow in quiet waters or in the surf, in clear water or in water rich in plankton or silt, or in an environment rich or poor in calcium (lime)- may greatly effect the appearance of an individual (Mayr, 1963). In an average population of *P. vulgata* L., 1758, high conical shells are encountered higher in the littoral while more flattened shells are found lower in the littoral. Within other gastropods colour bands may originate in response to changes in food supply. Longer or shorter spines are related with turbulence or strength of water currents. The ecophenotype is a nongenetic modification in response to an environmental condition (see: Habitat). – Titselaar, ftitsela@wxs.nl

Forms and varieties: From many species forms or varieties have been described in the literature. An example can be found with *P. vulgata* L., 1758, where, among others, the form *secernenda* has been described by Dautzenberg in 1887. Forms or varieties are as a rule caused by small genetic differences, and can occur within one population. The form *secernenda* occurs commonly, and individually, among animals who appear to look more like typical *P. vulgata*. The term variety is very ambiguous and has been - and is - used for a heterogeneous group of phenomena. All taxa introduced as a form or variety after 1960 are not valid (ICZN, 1985). – Titselaar, ftitsela@wxs.nl

Geographical barriers: Any terrain that prevents gene flow between populations can be referred to as a geographical barrier. One can think, for example, of the Azores, being geographically isolated by miles of ocean water from the mainland of Europe and Africa. Or the Caspian Sea, land-locked and isolated from other seas. Warm water currents, levels of salinity, upwellings of cold water or temperature fluctuations due to seasonal changes, can be regarded as some samples of geographical barriers that effect life in and along the coasts of seas and oceans. A new species develops when a population that is geographically isolated from the other populations of its parental species, acquires, during this period of isolation, characters that promote or guarantee reproductive isolation. Geographic speciation is considered to be the almost exclusive mode of speciation among animals (Mayr, 1963). One should take into consideration that this process of speciation is an event on a radically different timescale. It requires effort of the imagination to escape from the timescale that is familiar to us. – Titselaar, ftitsela@wxs.nl

Hybrids: The crossing of individuals belonging to two unlike natural populations that have secondarily come into contact, is called hybridization (Mayr, 1963). When prezygotic barriers are crossed and hybrid zygotes are formed, genetic incompatibility between the two species may abort development of the hybrid at some embryonic stage (hybrid inviability). Even if two species mate and produce hybrid offspring that are vigorous, reproductive isolation is intact if the hybrids are sterile because genes cannot flow from one species' gene pool to the other (hybrid sterility). In some cases when species cross-mate, the first-generation hybrids are viable and fertile, but when these hybrids mate with one another or with either parent species, offspring of the next generation are feeble or sterile. Even those hybrids that produce normal gametes in one or both sexes are unsuccessful in most cases and do not participate in reproduction. Finally, when they do backcross with the parental species the offspring is normally of inferior viability that are eliminated by natural selection. Successful hybridization is a rare phenomenon among animals (Mayr, 1963: 80). In literature intergrading, intermediate or transitional forms between two species belonging to the Patellidae are mentioned (Evans, 1947, 1953; Fischer-Piette, 1935, 1948). One should be careful to address these 'forms' as hybrids especially when only morphological characters (shape of the shell) are taken into account. Fischer-Piette (1948) e.g., notices that, by examining the gonads of transitional forms, he is able to identify all the Basque

forms as belonging to one species (op. cit.: 45). – Titselaar, ftitsela@wxs.nl

Morphological approach: The morphological approach dominated animal taxonomy for a long time but there are rivals in the field and it is steadily losing ground. Yet much contemporary thinking about species still rests on it (Mayr, 1963). The morphological approach has a number of traps. How can one determine whether, within a group of organisms, this group consists of different species, or only one species with a large degree of variability? Moreover, there are populations which are, according to morphological criteria, identical (convergence) while, based on another approach, it can be established that more species are involved. – Titselaar, ftitsela@wxs.nl

Population structure of species: Species consist of many local populations. When neighbouring populations of a species are compared, one finds that they usually differ from each other, slightly or appreciably, in a number of characteristics (Mayr, 1963: 215). These differences between local populations have provoked many authors to recognise too many species or subspecies within several European patellid species. It shows that all populations of a species can be classified under one (or more) of the following three structural components of species: (1) series of gradually changing contiguous populations; (2) populations that are geographical isolates; (3) rather narrow belts, often with sharply increased variability, bordered on either side by stable and rather uniform groups of populations (Mayr, 1963: 214). – Titselaar, ftitsela@wxs.nl

Populations and the origin of species: Species arise, change and go. The origin of new species is called 'speciation'. An important moment arises when a population becomes isolated from the parent population. Exchange of gametes can no longer occur. The evolution of the isolated population follows its own course. This isolation may be the result of geographical barriers which arose through time (allopatric speciation). The biological species concept emphasizes reproductive isolation. Splinter populations are better candidates for allopatric speciation than large ones, because genetic drift and natural selection can change a small gene pool faster (Mayr, 1963: 120), (see: Colonization). Speciation can also happen at the limits of two different species, where exchange of gametes occurs (parapatric speciation). Within a given population a subpopulation may arise, which, eventually, becomes separated from the parent population (sympatric speciation). Geographic speciation is the almost exclusive mode of speciation among animals (Mayr, 1963: 288). In addition one should take in mind that the occurrence of closely related species in one area could be the result of the original geographic barriers which disappeared through time. – Titselaar, ftitsela@wxs.nl

Reproductive barriers: Besides geographical barriers we discern prezygotic reproductive barriers. One can think of populations which live in the same area, but in a specific habitat (ecological isolation). Species which reproduce in different seasons, or different times of the day, cannot exchange gametes for that reason. Also the means by which partners are attracted, and behavior during courtship, can prevent, even with closely related species, mating (behavioral isolation). Also closely related species cannot mate because of different anatomy (mechanical isolation). And if it would occur that gametes of different species meet and mate after all, it might happen that there is no fertilisation (gametic isolation). – Titselaar, ftitsela@wxs.nl

Species and subspecies: Mankind likes to draw lines, even at places where they possibly cannot be drawn. Nature is never finished, and always on the move. The rise of species is a gradual process, and is characterised by a 'gray' area. In modern taxonomy, part of this gray area is coloured by the recognition of subspecies. Within these subspecies, the process of speciation has not been completed (yet). It is still a matter of one biological species, but the populations already show clear morphological differences. In Mayr's view (1963), within the animal kingdom subspecies are not a unit of evolution, except where it coincides with a geographical isolate. In all other cases it is merely a convenient pigeonholding device of the practicing taxonomist, who must be aware at all times of the shortcomings of this category (op. cit.: 210). And

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furthermore: "The modern definition of the subspecies is exceedingly different from that of the Linnaean geographic variety. It attempts to meet the various objections listed above and may be worded as follows: "A subspecies is an aggregate of phenotypically similar populations of a species inhabiting a geographic subdivision of the range of the species and differing taxonomically from other populations of the species". (Mayr, 1963: 210). – Titselaar, ftitsela@wxs.nl

Species: The Latin word 'species' means kind or appearance. Linnaeus, founder of taxonomy, described individual species based on their physical characteristics. Taken into account are e.g. the shape of the shell, structure of the radula or genitalia. This is still the most widespread method. Species described on the basis of physical appearance are called morphological species. – Titselaar, ftitsela@wxs.nl

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