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Revision of the genus *Pseudopomatias* and its relatives (Gastropoda: Cyclophoroidea: Pupinidae)

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Abstract

The present paper revises all species that have been assigned to *Pseudopomatias* Möllendorff, 1885 and *Nodopomatias* Gude, 1921. The following new species are described: *Pseudopomatias ableti* Páll-Gergely, **n. sp.** (northeastern India), *Pseudopomatias harli* Páll-Gergely, **n. sp.** (northeastern India), *Pseudopomatias linanprietoae* Páll-Gergely **n. sp.** (Laos), *Pseudopomatias maasseni* Páll-Gergely & Hunyadi, **n. sp.** (Vietnam and China), *Pseudopomatias nitens* Páll-Gergely **n. sp.** (Vietnam), *Pseudopomatias prestoni* Páll-Gergely, **n. sp.** (northeastern India), *Pseudopomatias reischuetzi* Páll-Gergely, **n. sp.** (north-eastern India), *Pseudopomatias shanensis* Páll-Gergely **n. sp.** (Myanmar) and *Pseudopomatias sophiae* Páll-Gergely, **n. sp.** (Vietnam). *Pseudopomatias fulvus* is moved to the synonymy of *P. amoenus*. *Csomapupa* **n. gen.** is erected for *Pseudopomatias grandis* and *P. luyorensis*. Another new genus, *Vargapupa* is erected with two species, namely *Vargapupa biheli* Páll-Gergely, **n. sp.** (Vietnam) and *V. oharai* Páll-Gergely, **n. sp.** (Laos). Both new genera are probably closely related to *Pseudopomatias* and *Nodopomatias*. All the currently available type specimens of species in these groups are figured. Anatomical information of *P. eos* and DNA sequence data of two *Pseudopomatias* species indicate that the genus is a member of the family Pupinidae. The other pre-existing hypothesis, namely that *Pseudopomatias* is a member of the Cochlostomatidae, is not supported by our results.

Key words: taxonomy, *Nodopomatias*, *Vargapupa*, *Csomapupa*, distribution, plicae, operculum

Introduction

Operculate snails ("Prosobranchia") may represent 30 to 50% of the total number of land snail species of tropical and subtropical areas (Neubert 2009). The taxonomy of terrestrial operculate snails began by classifying taxa with large shells, mainly of the genus *Cyclophorus* s. l. (Kobelt 1902, Nantarat *et al.* 2014). Due to their great variability in shell size, shape and colour patterns across wide distribution ranges, they were taxonomically over-split into more than 100 nominal taxa by the end of the 19th Century. On the other hand, analysis of variations in karyotype (Kongim *et al.* 2006), allozyme (Prasankok *et al.* 2009) and DNA nucleotide sequence (Nantarat *et al.* 2014) suggests that geographically distant populations that were previously assigned to *C. fulguratus* (Pfeiffer, 1854) are as genetically divergent as good species. In contrast, the diversity of operculate snails with relatively small shells (e.g. Pupinidae, Alycaeidae) remains little known with only few studies of taxonomy.

Kobelt (1902) revised all terrestrial operculate species. That monograph was based on shell and opercular characters only. The genus *Pseudopomatias* was established by Möllendorff (1885) for the Chinese *Pseudopomatias amoenus* Möllendorff, 1885. Möllendorff (1885) also assigned to this genus some former Northeastern Indian and Burmese *Pomatias* species, namely *P. himalayae* (Benson 1859), *P. pleurophorus* (Benson 1857) (originally described as *Bulimus*), *P. peguensis* (Theobald 1864) and *P. grandis* (Godwin-Austen 1876). However, Möllendorff (1885) indicated with a question mark that his classification of these former *Pomatias* species in *Pseudopomatias* is questionable, perhaps because, as he stated later (Möllendorff 1886), he had seen only illustrations and descriptions of the Indian species. Later, the following six *Pseudopomatias* taxa were described: *P. amoenus* var. *tumidula* Möllendorff, 1886 (Hunan, China), *P. fulvus* Möllendorff, 1901 (Tonkin, Vietnam), *P. eos* Pilsbry & Hirase, 1905 (Taiwan), *P. luyorensis* Godwin-Austen, 1917 and *P. siyomensis* Godwin-Austen, 1917 (both from northeastern India).

Möllendorff (1885) described the shell of the genus *Pseudopomatias* as conical-turriform and very similar to that of *Pomatias* (now *Cochlostoma* Jan, 1830), but with a simple, membrane-like, arctispiral operculum. Kobelt's (1902: 272) diagnosis is the following: *Pseudopomatias* has a conical turriform shell that is very similar to that of *Cochlostoma* in shape and sculpture, has regular ribs, the aperture slightly ascending in front and the operculum is thin, membranous, closely coiled.

Godwin-Austen (1917) established the genus *Eupomatias* for two newly described northeastern Indian species (*E. sibbumensis* and *E. oakesi*) because of the presence of a keel around the umbilicus. This, however, is a junior homonym of *Eupomatias* Wagner, 1897 (see also Zallot *et al.* 2015) and therefore, Gude (1921) introduced the name *Nodopomatias* to replace Godwin-Austen's *Eupomatias*.

The taxonomic positions of *Pseudopomatias* and *Nodopomatias* have been debated. Blanford (1864) classified *Pomatias himalayae* and *Pomatias* (*Bulimus*) *pleurophorus* into the cyclophorid subfamily Pomatiasinae. According to his description, these Asian species are indistinguishable from European members of the genus *Pomatias* (=*Cochlostoma*) in general form and sculpture and only differ slightly from Southern European species

Pseudopomatias and related genera are associated with limestone areas but little is known about their ecology. Living specimens are rare and our knowledge is limited to some cases when living specimens were observed. In those cases, living specimens of *P. eos*, *P. amoenus*, *P. nitens* **n. sp.** and *P. maasseni* **n. sp.** occurred at the bases of large limestone cliffs among leaf-litter and humus. This indicates that unlike *Cochlostoma* and other obligate rock-dwelling cyclophoroids, *Pseudopomatias* is a ground-dwelling group in the strict sense.

Based on available distribution records, there are two geographical centres of the *Pseudopomatias* diversity, one in northeastern India and another one in northern Vietnam. It is not easy to assess whether this pattern reflects reality or simply due to uneven sampling effort. However, in spite of intensive collection efforts at the end of the 19th and the beginning of the 20th century in Myanmar, only few (probably two) samples are known from those areas. This suggests that populations in the genus are not abundant in east of the Himalaya region. Also, during their recent collection trips, Japanese malacologists who provided material for this study and one of the authors (A.H.) obtained only a few small samples from Guangxi. This suggests that north of Northern Vietnam the abundance of the genus decreases.

Most of new species described in this study were collected more than a century ago in India, Myanmar and Vietnam. Some malacologists (e.g. Godwin-Austen) who collected those specimens were aware of recording collecting localities in relatively fine geographical scales at that time. However, during the "Golden Era" of taxonomy (approximately 1860–1920), when most of our knowledge on Asian mollusc faunas was gathered, the majority of taxa were described with poor locality data. Redescriptions with exact information of localities have often been necessary in taxonomic revisions based on recent collections (e.g. Nordsieck 2011; Sutcharit & Panha 2011). Detailed and comprehensive descriptions of shell characters presented in this study provide a basis for future investigation on the systematics, natural history, biology and threats of *Pseudopomatias*.

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Literature

Adam, W. (1971) New names introduced by M. Connolly and by H. B. Preston in the Mollusca. *Institut Royal des Sciences Naturelles de Belgique, Bulletin/Koninklijk Belgisch Instituut voor Natuurwetenschappen, Bulletin*, 47 (24), 1–77.

Adams, H. (1866) Descriptions of Fifteen New Species of Land and Freshwater Shells from Formosa, collected by Robert Swinhoe, Esq., Consul at Taiwan in that Island. *Proceedings of the Zoological Society of London*, 316–319.

Bavay, A. & Dautzenberg, Ph. (1903) Description de Coquilles Nouvelles de l'Indo-Chine. *Journal de Conchyliologie*, 57, 201–236.

Benson, W.H. (1857) New species of *Bulimus* from India, Burma and the Mauritius. *The Annals and Magazine of Natural History,* Series 2, 19, 327–330.

Benson, W.H. (1859) A Sectional Distribution of the genus *Alycæus*, Gray, with Characters of six new species and of other Cyclostomidæ collected at Darjiling by W. T. Blanford, Esq., Geol. Survey. *Annals and Magazine of Natural History*, 3 (3), 176–184.

Blanford, W.T. (1864) On the Classification of the Cyclostomacea of Eastern Asia. *The Annals and Magazine of Natural*

History, Series 3, 13, 441–465.
Cadahía, L., Harl, J., Duda, M., Sattmann, H., Kruckenhauser, L., Fehér, Z., Zopp, L. & Haring, E. (2014) New data on the phylogeny of Ariantinae (Pulmonata, Helicidae) and the systematic position of Cylindrus obtusus based on nuclear and mitochondrial DNA marker sequences. *Journal of Zoological Systematics and Evolutionary Research*, 52, 163–169. http://dx.doi.org/10.1111/jzs.12044
Capella-Gutiérrez, S., Silla-Martínez, J.M. & Gabaldón, T. (2009) trimAl: a tool for automated alignment trimming in large-scale phylogenetic analyses. *Bioinformatics*, 25, 1972–1973. http://dx.doi.org/10.1093/bioinformatics/btp348
Colgan, D.J., Ponder, W.F. & Eggler, P.E. (2000) Gastropod evolutionary rates and phylogenetic relationships assessed using partial 28S rRNA and histone H3 sequences. *Zoologica Scripta*, 29, 29–63. http://dx.doi.org/10.1046/j.1463-6409.2000.00021.x
Colomba, M., Liberto, F., Gregorini, A. Renda, W., Reitano, A. & Sparacio, I. (2014) The *Cochlostoma* (*Holcopoma*) *westerlundi* group in Italy (Caenogastropoda: Cochlostomatidae). *Biologia*, 69, 771–779. http://dx.doi.org/10.2478/s11756-014-0372-x
Cox, J.C. (1892) Descriptions of some new species of Pulmonate Mollusca from Australia and the Solomon Islands. *Proceedings of the Linnean Society of New South Wales, [2]*, 6, 565–570, 2 pls.
Dance, S.P. (1986) *A History of shell collecting*. E. J. Brill, Leiden, 265 pp.
Dautzenberg, Ph. & Fischer, H. (1908) Liste des mollusques récoltés par M. Mansuy en Indo-Chine et description d'espèces nouvelles. *Journal de Conchyliologie*, 56, 169–217.
De Mattia, W., Zallot, E. & Prodan, M. (2011) *Cochlostoma gracile* (L. Pfeiffer, 1849) in Italy (Architaeniglossa, Cochlostomatidae). *Basteria*, 75 (1/3), 1–9.
Đỗ, V.N., Hoàng, N.K. & Khổng, T.A. (2010) Preliminary data on lansnails (Gastropoda) in Xom Du village, Xuan Son National Park, Phu Tho province. *Tạp Chí Sinh Học*, 32 (1), 13–16. [in Vietnamese]
Edgar, R.C. (2004) MUSCLE: multiple sequence alignment with high accuracy and high throughput. *Nucleic Acids Research*, 32, 1792–1797. http://dx.doi.org/10.1093/nar/gkh340
Egorov, R. (2013) A review of the genera of the terrestrial pectinibranch molluscs (synopsis mainly based on published data). Littoriniformes: Liareidae, Pupinidae, Diplommatinidae, Alycaeidae, Cochlostomidae. *Treasure of Russian Shells,* Supplement 3 (Part 3), 1–62.
Fischer, H. & Dautzenberg, Ph. (1904) Catalogue des mollusques terrestres et fluviatiles de l'Indo-Chine orientale cites jusqu'à ce jour. *Mission Pavie, Études diverses*, 3, 390–442.
Godwin-Austen, H.H. (1876) On the *Cyclostomacea* of the Dafla Hills, Assam. *The Journal of the Asiatic Society of Bengal*, 45 (2), 171–184.
Godwin-Austen, H.H. (1889) On a Collection of Land-Shells made in Borneo by Mr. A. Everett, with Descriptions of supposed new species. Part I. *Proceedings of the scientific meetings of the Zoological Society of London*, 332–355.
Godwin-Austen, H.H. (1917) Zoological results of the Abor Expedition, 1911–12. XLVII Mollusca, VII. Cyclophoridae (in part) *Records of the Indian Museum*, 8, 493–580.
Gray, J.E. (1847) A list of genera of Recent Mollusca, their Synonyma and Types *Proceedings of the Zoological Society of London*, 15, 129–219.
Gredler, V. (1887) Zur Conchylien-Fauna von China. X. Stück. Uebersicht der continentalen chinesischen Binnenschnecken. *Malakozoologische Blätter*, 9, 120–163.
Gude, G.K. (1921) *The Fauna of British India including Ceylon and Burma. Mollusca.—III. Land operculates (Cyclophoridae, Truncatellidae, Assimineidae, Helicinidae)*. Taylor and Francis, London, 386 pp. http://dx.doi.org/10.5962/bhl.title.12890
Hanley, S.C.T. & Theobald, W. (1870–1876) *Conchologia Indica; Being Illustrations of the Land and Freshwater Shells of British India*. L. Reeve & Co., London, CLX + 65 pp.
Harl, J., Duda, M., Kruckenhauser, L., Sattmann, H. & Haring, E. (2014a) In Search of Glacial Refuges of the Land Snail *Orcula dolium* (Pulmonata, Orculidae) - An Integrative Approach Using DNA Sequence and Fossil Data. *PLoS ONE*, 9 (5), e96012. http://dx.doi.org/10.1371/journal.pone.0096012
Harl, J., Páll-Gergely, B., Kirchner, S., Sattmann, H., Duda, M., Kruckenhauser, L. & Haring, E. (2014b) Phylogeography of the land snail genus Orcula (Orculidae, Stylommatophora) with emphasis on the Eastern Alpine taxa: speciation, hybridization and morphological variation. *BMC Evolutionary Biology*, 14 (1), 223. http://dx.doi.org/10.1186/s12862-014-0223-y
Heude, R.P.M. (1886) Diagnoses Molluscorum novorum in Sinis collectorum (1). *Journal de Conchyliologie*, 34, 208–215.
Heude, R.P.M. (1890) *Mémoires concernant l'histoire naturelle de l'empire chinois par des pères de la Compagnie de Jésus. Notes sur les Mollusques terrestres de la vallée du Fleuve Bleu*. Mision Catholique, Chang-Hai, pp. 125–188.
Hu, Z., Yin, H. & Chen, D. (2004) (Terrestrial Mollusca of the Nanling National Park). *Journal of Natural Science of Hunan Normal University*, 27 (2), 67–70. (In Chinese)
Jan, G. (1830) Scientiae naturalis cultoribus. *Conspectus methodicus testaceorum in collectione mea exstantium anno 1830*, 1–8.

Johnson, R.J. (1973) Heude's Molluscan Types: or, Asian land and fresh water mollusks, mostly from the People's Republic of China, described by P. M. Heude. *Cambridge, Massachusetts Special Occasional Publication, Department of Mollusks, Museum of Comparative Zoology, Harvard University*, 1–111.

Kerney, M.P. & Cameron, R.A.D. (1979) *A Field Guide to the Land Snails of Britain and North-west Europe*. Collins, London, 288 pp.

Kobelt, W. (1902) *Das Tierreich. Eine Zusammenstellung und Kennzeichnung der rezenten Tierformen. In Verbindung mit der Deutschen Zoologischen Gesellschaft herausgegeben von der Königlich Preussischen Akademie der Wissenschaften zu Berlin. Mollusca: Cyclophoridae*. R. Friedländer und Sohn, Berlin, 662 pp.

Kobelt, W. & Möllendorff, O. von (1897) Catalog der gegenvärtig lebend bekannten Pneumonopomen. *Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft*, 29, 73–88, 105–120, 137–152.

Kongim, B., Naggs, F. & Panha, S. (2006) Karyotypes of operculate land snails of the genus Cyclophorus (Prosobranchia: Cyclophoridae) in Thailand. *Invertebrate Reproduction and Development*, 49, 1–8.
http://dx.doi.org/10.1080/07924259.2006.9652188

Kongim, B., Sutcharit, C., Naggs, F. & Panha S (2013) Taxonomic revision of the Elephant Pupinid snail genus *Pollicaria* Gould, 1856 (Prosobranchia, Pupinidae). *ZooKeys*, 287, 19–40.
http://dx.doi.org/10.3897/zookeys.287.4617

Mayr, E. (1942) *Systematics and the origin of species*. Columbia University Press, New York, 334 pp.

Möllendorff, O.F. von (1885) Diagnoses specierum novarum sinensium. *Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft*, 11–12, 161–170.

Möllendorff, O.F. von (1886) Materialen zur Fauna for China. *Jahrbücher der Deutschen Malakozoologischen Gesellschaft*, 13, 156–210.

Möllendorff, O. von (1901) Diagnosen neuer von H. Fruhstorfer in Tongking gesammelter Landschnecken. *Nachrichtsblatt der Deutschen Malakozoologischen Gesellschaft*, 33 (5/6), 65–81.

Nantarat, N., Sutcharit, C., Tongkerd, P., Ablett, J., Naggs, F. & Panha, S. (2014) An annotated catalogue of type specimens of the land snail genus *Cyclophorus* Monfort, 1810 (Caenogastropoda, Cyclophoridae) in the Natural History Museum, London. *ZooKeys*, 411, 1–56.
http://dx.doi.org/10.3897/zookeys.411.7258

Nevill, G. (1878) *Hand list of Mollusca in the Indian Museum, Calcutta. Part I. Gastropoda. Pulmonata and Prosobranchia-Neurobranchia*. Order of the Trustees, Calcutta, 338 pp.
http://dx.doi.org/10.5962/bhl.title.6561

Neubert, E. (2009) The continental malacofauna of Arabia and adjacent areas. VI. Pomatiidae of Arabia, Socotra and Northeast Africa, with descriptions of new genera and species (Gastropoda: Caenogastropoda: Littorinoidea) *Fauna of Arabia*, 24, 47–127.

Nordsieck, H (1982) Die Evolution des Verschlußapparats der Schließmundschnecken (Gastropoda: Clausiliidae). *Archiv für Molluskenkunde*, 112 (1/6), 27–43.

Nordsieck, H. (2011) Clausiliidae of Vietnam with the description of new taxa (Gastropoda: Stylommatophora) *Archiv für Molluskenkunde*, 140 (2), 149–173.

Palumbi, S.R. (1996) PCR and molecular systematics. *In*: Hillis, D., Moritz, C. & Mable, B. (Eds.), *Molecular Systematics. 2nd Edition*. Sinauer Press, Sunderland, pp. 205–248.

Pilsbry, H.A. & Hirase, Y. (1905) Catalogue of the Land and Fresh-water Mollusca of Taiwan (Formosa), with Descriptions of New Species. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 57, 720–752.

Pfeiffer, L. (1853) *Catalogue of Phaneropneumona or Terrestrial Operculated Mollusca in the Collection of the British Museum*. Woodfall & Kinder, London, 324 pp.

Pfeiffer, L. (1854) Descriptions of sixty-six new land shells from the collection of H. Cuming, Esq. *Proceedings of the Zoological Society of London*, 20 (1852), 56–70.

Pfeiffer, L. (1859) *Monographia heliceorum viventium, sistens descriptions systematicas et criticas omnium huius familiae generum et specierum hodie cognitarum. Vol. 4.* F.A. Brockhaus, Leipzig, 920 pp.

Pfeiffer, L. (1865) *Monographia Pneumonopomorum viventium. Sistens Descriptiones Systematicas et Criticas Omnium Hujus Ordines Generum et Specierum Hodie Cognitarum, Accedente Fossilium Enumeratione. Supplement 2.* Th. Fischer, Casellis, pp. 284 pp.

Pfeiffer, L. (1870–1876) *Novitates Conchologicae, Series prima. Mollusca extramarina. Descriptions et figures de coquilles, estramarines nouvelle, ou peu connues. Beschreibung and Abbuildung neuer oder kritischer Land- and Süsswasser Mollusken*. *4.* T. Fischer, Cassel, Germany, 171 pp.

Prasankok, P., Sutcharit, C., Tongkerd, P. & Panha, S. (2009) Biochemical assessment of the taxonomic diversity of the operculate land snail, *Cyclophorus fulguratus* (Gastropoda: Cyclophoridae), from Thailand. *Biochemical Systematics and Ecology*, 36 (12), 900–906.
http://dx.doi.org/10.1016/j.bse.2008.11.005

Reichenbach, F., Baur, H. & Neubert, E. (2012) Sexual dimorphism in shells of *Cochlostoma septemspirale* (Caenogastropoda, Cyclophoroidea, Diplommatinidae, Cochlostomatinae). *ZooKeys*, 208, 1–16.
http://dx.doi.org/10.3897/zookeys.208.2869

Páll-Gergely, B., Hunyadi, A. & Maassen, W.J.M. (2014) Review on *Rhaphaulus* L. Pfeiffer, 1856 and *Streptaulus* Benson,

1857 species with description of *Rh. tonkinensis* n. sp. from Vietnam (Gastropoda: Pupinidae). *Journal of Conchology*, 41, 565–573.

Ronquist, F., Teslenko, M., van der Mark, P., Ayres, D., Darling, A., Höhna, S., Larget, B., Liu, L., Suchard, M.A. & Huelsenbeck, J.P. (2012) MrBayes 3.2: efficient Bayesian phylogenetic inference and model choice across a large model space. *Systematic Biology*, 61, 170–173.
http://dx.doi.org/10.1093/sysbio/sys029

Sánchez, R., Serra, F., Tárraga, J., Medina, I., Carbonell, J., Pulido, L., de María, A., Capella-Gutiérrez, S., Huerta-Cepas, J., Gabaldón, T., Dopazo, J. & Dopazo, H. (2011) Phylemon 2.0: a suite of web-tools for molecular evolution, phylogenetics, phylogenomics and hypotheses testing. *Nucleic Acids Research*, 39, 470–474.
http://dx.doi.org/10.1093/nar/gkr408

Saurin, E. (1953) Coquilles nouvelles de l'Indochine. *Journal de Conchyliologie*, 93 (4), 113–120.

Schilthuizen, M. (2003) Sexual selection on land snail shell ornamentation: a hypothesis that may explain shell diversity. *BMC Evolutionary Biology*, 3, 13.
http://dx.doi.org/10.1186/1471-2148-3-13

Schilthuizen, M., Teräväinen, M.I.F., Tawith, N.F.K., Ibrahim, H., Chea, S.M. Chuan, Ch.P., Daim, L.J., Jubaidi, A., Madjapuni, M.J., Sabeki, M. & Moktar, A. (2002) Microsnails at microscales in Borneo: distributions of Prosobranchia versus Pulmonata. *Journal of Molluscan Studies*, 68, 255–258.
http://dx.doi.org/10.1093/mollus/68.3.255

Sowerby, G.B. II (1864–1866) *Thesaurus Conchyliorum, or Monographs of Genera of Shells* 3: Sowerby, London, 331 pp. + 290 plates.

Sutcharit, Ch. & Panha, S. (2011) Neotype designation and re-description of the vanishing tree snail, *Amphidromus* (*Amphidromus*) *mundus* (Pfeiffer, 1853) (Pulmonata: Camaenidae). *The Raffles Bulletin of Zoology*, 59 (2), 139–143.

Thanh, Đ.N. (2008) Tình hình và kết quả điều tra thành phần loài ốc ở can ở Việt Nam hiện nay (Overview on the species composition of the landsnails fauna of Vietnam). *Sinh Hoc Journal of Biology*, 30 (4), 1–15. [in Vietnamese]

Tamura, K., Stecher, G., Peterson, D., Filipski, A. & Kumar, S. (2013) MEGA6: Molecular Evolutionary Genetics Analysis Version 6.0. *Molecular Biology and Evolution*, 30, 2725–2729.
http://dx.doi.org/10.1093/molbev/mst197

Theobald, W. (1864) Notes on the Variation of Some Indian and Burmese Helicidae, with an Attempt at their re-arrangement, Together with Descriptions of New Burmese Gasteropoda. *Journal of the Asiatic Society of Bengal*, 33, 238–250.

Thomsen, P.F., Elias, S., Gilbert, M.T.P., Haile, J., Munch K., Kuzmina, S., Froese, D.G., Sher, A., Holdaway, R.N. & Willerslev, E. (2009) Non-Destructive Sampling of Ancient Insect DNA. *PLoS ONE*, 4 (4), e5048.
http://dx.doi.org/10.1371/journal.pone.0005048

Tielecke, H. (1940) Anatomie, Phylogenie und Tiergeographie der Cyclophoriden. *Archiv für Naturgeschichte*, 9, 317–371.

Yen, T.-C. (1939) *Die Chinesischen Land-und Süßwasser-Gastropoden des Natur-Museums Senckenberg*. Abhandlungen der Senckenbergischen Naturforschenden Gesellschaft, Frankfurt am Main, 234 pp.

Uit de Weerd, D.R., Piel, W.H. & Gittenberger, E. (2004) Widespread polyphyly among Alopiinae snail genera: when phylogeny mirrors biogeography more closely than morphology. *Molecular Phylogenetics and Evolution*, 33, 533–548.
http://dx.doi.org/10.1016/j.ympev.2004.07.010

Uit de Weerd, D.R. & Gittenberger, E. (2013) Phylogeny of the land snail family Clausiliidae (Gastropoda: Pulmonata). *Molecular Phylogenetics and Evolution*, 67, 201–216.
http://dx.doi.org/10.1016/j.ympev.2013.01.011

Varga, A. (1972) Neue Schnecken-Arten aus Vietnam (Gastropoda, Cyclophoridae). *Annales Historico-Naturales Musei Nationalis Hungarici*, 64, 133–137.

Varga, A. (1984) The *Cochlostoma* genus (Gastropoda, Prosobranchiata) in Yugoslavia. I. Anatomical studies. *Miscellanea Zoologica Hungarica*, 2, 51–64.

Wagner, A.J. (1897) Monographie der Gattung *Pomatias* Studer. *Denkschriften der Kaiserlichen Akademie der Wissenschaften Mathematisch-Naturwissenschaftlichen*, 64, 565–632.

Webster, N.B., Van Dooren, T.J.M. & Schilthuizen, M. (2012) Phylogenetic reconstruction and shell evolution of the Diplommatinidae (Gastropoda: Caenogastropoda). *Molecular Phylogenetics and Evolution*, 63, 625–638.
http://dx.doi.org/10.1016/j.ympev.2012.02.004

Wu, S.-P., Hwang, C.-C. & Lin, Y.-S. (2008) Systematic revision of the arboreal snail *Satsuma albida* species complex (Mollusca: Camaenidae) with descriptions of 14 new species from Taiwan. *Zoological Journal of the Linnean Society*, 154, 437–493.
http://dx.doi.org/10.1111/j.1096-3642.2008.00415.x

Zallot, E., Groenenberg, D.S.J., De Mattia, W., Fehér, Z. & Gittenberger, E. (2015) Genera, subgenera and species of the Cochlostomatidae (Gastropoda, Caenogastropoda, Cochlostomatidae). *Basteria*, 78 (4–6), 63–88.