

FIRST ANATOMIC DATA AND TAXONOMICAL CLARIFICATION OF *SUBOESTOPHORA KUIPERI* (GASULL, 1966) (MOLLUSCA, GASTROPODA: HYGROMIIDAE)

ALBERTO MARTÍNEZ-ORTÍ¹ & FERNANDO ROBLES²

Abstract Live specimens of *Oestophora* (*Suboestophora*) *kuiperi* Gasull, 1966 (currently *Suboestophora kuiperi*) were first found in the type-locality (Cullera, province of Valencia, Spain). The shell and genitalia of this species are studied and compared with those of *Suboestophora boscae* (Hidalgo, 1869), congeneric species with which the same geographic area is shared. It can be concluded that *S. kuiperi* is a junior synonym of *S. boscae*.

Key words Hygromiidae, *Suboestophora kuiperi*, *Suboestophora boscae*, synonymy, Spain.

INTRODUCTION

Gasull (1966) described a new species, *Oestophora* (*Suboestophora*) *kuiperi*, collected at "...macizo de Cullera. Castillo. Peñascos sobre la cantera al S..." (...massif of Cullera. Castle. Boulders on the quarry in the South...). Furthermore, Prieto (1986) elevates the subgenus *Suboestophora* to generic status, establishing the new *Suboestophora kuiperi* (Gasull, 1966) combination.

Gasull (1966) justified the new species solely on the basis of the characteristics of the shell not having found any live samples. According to this author, *S. kuiperi* resembles *S. boscae* (Hidalgo, 1869), differentiated by its smaller size, by having one whorl less, by its tight, regular, stronger constulation, and by the shape of the aperture (angularity and callosity of the peristoma).

S. kuiperi is an extremely scarce rare species, and after an increased number of unsuccessful samplings in the type-locality in recent years, the authors have collected a live adult specimen, that allows description of the genitalia of this species for the first time ever (Martínez-Ortí, 1999). The type-series of *S. kuiperi* has been revised designating its lectotype, and thus the validity of this species is discussed from the studies of both the shell and its anatomical characteristics.

DESIGNATION OF LECTOTYPES OF *S. KUIPERI* AND *S. BOSCAE*

SELECTION OF THE LECTOTYPE OF *S. KUIPERI*

The sample with the original material used by Gasull was deposited in the Museu de Zoologia de Barcelona (MZB) with the number 84-1894 and presents a label with the following inscription: "*Oestophora kuiperi* Gas. Cullera. Castillo. (7). 16.11.66- Gasull leg. Valencia". The number 7 seems to indicate the number of specimens present in the sample at the time of its deposit. At the time of our review, the container was comprised of only 6 specimens, which must be considered as syntypes. Only two of them appear complete and in good condition. A comparison has been made between the shells and those that appear in the original photographs of Gasull (1966, p. 159) in order to identify them and select the lectotype. Only one of the two shells figured by the author has been found in the sample, selecting it as a lectotype (Figs 1a-c and 3a-c), with the number 84-1894-A. The five paralectotypes have been separated with the number 84-

¹ Museu Valencià d'Història Natural, Passeig de la Petxina, 15. E-46008 Valencia, Spain. alberto.martinez@uv.es

² Instituto Cavanilles de Biodiversidad y Biología Evolutiva and Departamento de Geología, Facultad de Ciencias Biológicas, Universitat de València, E-46100 Burjassot, Valencia, Spain. roblesf@uv.es

1894-B.

The dimensions of the lectotype are 9.05 mm in diameter and 4.45 mm in height, 6 whorls and an umbilicus of 1.30 mm width. The dimensions of the complete paralectotype are 8.20 mm in diameter and 4.10 mm in height, with $5\frac{3}{4}$ whorls and an umbilicus of 1.20 mm width.

This data differs slightly from that offered by Gasull (1966, 1975), reproduced in table 1. It must be considered that the missing specimen of the sample could not be thus measured.

OBSERVATIONS ABOUT THE TYPE OF *SUBOESTOPHORA BOSCAE*

The specimen figured by Hidalgo (1869: Plate 2, Fig. 1) is conserved in the Musée National d'Histoire Naturelle of Paris and has been designated by Fischer-Piette (1950) as the type of the species. In accordance with article 73, recommendation 73F of the ICZN, this sample must be considered as the Lectotype of the species. According to Miguel Villena, of the Museo Nacional de Ciencias Naturales of Madrid (MNCNM), who revised this sample, the locality that figures in the label is "Puebla de Rugat (now Poblá del Duc), Valencia", it must be considered as a restricted type locality. The measurements obtained by Miguel Villena are: 9 mm maximum diameter, 8.7 minimum diameter and 3.7 mm in height.

STUDIED MATERIAL

S. KUIPERI

Two live specimens, one adult and another juvenile, as well as an empty shell, were collected by the authors in the type locality of "Castillo de Cullera" (UTM 30TYJ3749) on 1/10/94, after a strong storm and under blocks of calcareous rocks of great dimensions (Martínez-Ortí, 1999). This material is deposited in the Museu Valencià d'Història Natural of Valencia (MVHN, Martínez-Ortí coll., sample n° 180V).

S. BOSCAE

For the study of *S. boscae* abundant material collected by the authors has been used. Also, consultations were made to material belonging to this species deposited at the MVHN (Siro de Fez coll.), at the MNCNM (Hidalgo and Ortiz de Zárate colls.) and at the MZB (Bofill, Chía, Gasull and Martorell colls.). The results are detailed in Martínez-Ortí (1999).

COMPARATIVE STUDY OF *S. BOSCAE* AND *S. KUIPERI*

SHELL

The differences between the shells of *S. kuiperi* and *S. boscae*, used by Gasull (1966) to base the description of the first of these species, lack content when the shell variability of *S. boscae* is studied. The first criteria used is size. Gasull (1966) indicated that *S. kuiperi* has a much smaller size than *S. boscae*. However, the shell size of *S. boscae* varies amongst broad parameters (Table 1) and specifically the lectotype of *S. boscae* is slightly smaller than the lectotype of *S. kuiperi*. Both samples find themselves near the minimum size in the variation rank for *S. boscae*.

The second criteria used by Gasull to differentiate the species is the existence of one whorl less (6) in *S. kuiperi* compared to *S. boscae* ($6\frac{1}{2}$ -7). However, live samples of *S. boscae* examined by the authors show that the number of whorls could vary between

TABLE 1

Shell and genitalia measurements for populations of *Suboestophora kuiperi* (Gasull, 1966) and *S. boscae* (Hidalgo, 1869) (Abbreviations: aDs accessory Dart-sac BC Bursa Copulatrix BCc duct of Bursa Copulatrix D Dart Ds Dart-sac Ep Epiphallus FI Flagellum fov free oviduct gm glandulae mucosae H height Loc locality NSp number of specimens Ø diameter P penis Prim Penial retractor muscle NS number of sample U umbilicus V vagina W whorls (in mm)).

Loc	<i>Suboestophora kuiperi</i>				<i>Suboestophora boscae</i>			
	Gasull (1966)	Cullera	Benichembla	Beniarbeig	Orba	Quesa	Pego	Pobla del Duc
NS	84-1984 (MZB)	180V Lectotype	1A	60A	66A	123V	130A	Holotype
SHELL								
NSp	?	2	7	10	12	10	12	
Ø	8.7-9.2	8.6-8.8	11.4-12.1	10.90	12.5-12.8	9.1-10.8	11.4-12.4	9
H	4.2-4.5	4.4-4.5	5.3-6.2	5.2	5.4-6.2	4.5-5.5	5.5-5.9	3.7
W	6	6	61/2-65/8	61/8	65/8-7	51/2-61/8	63/4-7	-
U	1.0	1.2	1.45-1.6	1.4	1.50-1.75	1.4-1.85	1.4-1.5	-
GENITALIA								
NSp	-	1	1	1	1	3	1	-
FI	-	1.00	1.60	1.45	1.20	1.75-1.80	1.35	-
Ep	-	1.95	2.10	2.50	1.50	2.40-2.85	2.45	-
P	-	4.25	6.80	5.00	4.25	4.75-5.10	5.00	-
Prim	-	3.05	3.60	2.30	-	-	3.55	-
BC	-	0.4x1.4	0.65x1.75	0.5x1.8	0.85x1.05	0.5-0.65x1.0-1.7	0.5x2.50	-
BCc	-	4.05	4.0	3.55	2.15	3.50	6.15	-
D	-	0.70	-	-	-	-	0.65	-
Ds	-	0.85	1.20	1.00	1.00	0.95-1.25	1.45	-
aDs	-	1.35	2.75	2.25	2.25	1.85-1.90	2.95	-
fov	-	4.00	3.80	4.25	4.20	3.50	5.45	-
V	-	1.40	4.25	2.80	1.15	2.25-2.30	1.95	-
gm	-	(4) 5.25	(4)10.85	(4) 6.00	(4) 6.15	(4) 7.15	(4) 12.60	-

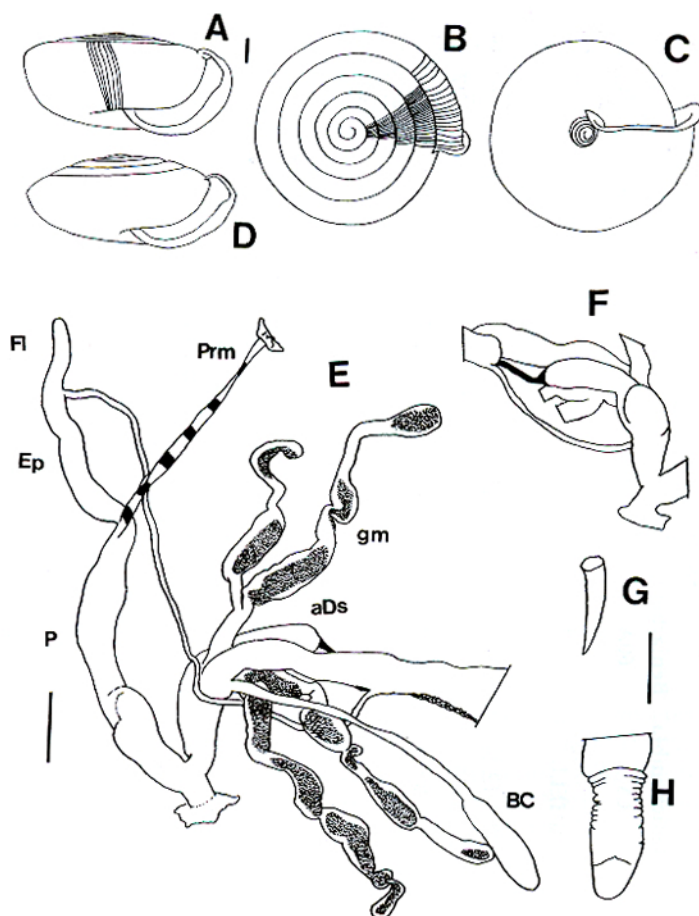


Fig. 1 *Oestophora (Suboestophora) kuiperi* Gasull, 1966 A-C Drawing of the lectotype ("Castillo de Cullera", N°84-1894-A, MZB) D Shell (Cullera N°180V, Martínez-Ortí coll., MVNH) E Genitalia (N°180V); F Detail of the dart-sac complex G Dart H Penis. Scale bar = 1 mm.

5½ (Quesa) and 7 (Orba and Pego) (Table 1). Thirdly, Gasull (1966) indicates that *S. kuiperi* presents a stronger axial ribbing, much tighter and more regular than that of *S. boscae*. As can be observed in the samples represented in Fig. 3, the axial ribbing of *S. boscae* is very variable and samples like the ones from Orba (Fig. 3j-l), that find themselves in the upper limit of the species' size range, present an axial ribbing pattern similar to the lectotype of *S. kuiperi* from Cullera (Figs 3a-c).

The final characteristics used by Gasull (1966) to justify the validity of *S. kuiperi* refer to the morphology of the peristome. The observation of the lectotype of *S. kuiperi* indicates that it is an adult specimen that has not yet reached its growth limit, and therefore some of its features, like the angularity and callosity of the peristome's opening edge have not reached a definitive morphology. In fact, the live sample captured by the authors (Fig. 1d) presents these characteristics even more accentuatedly and within the variability of *S. boscae* (Figs 2a-c; Figs 3d-l).

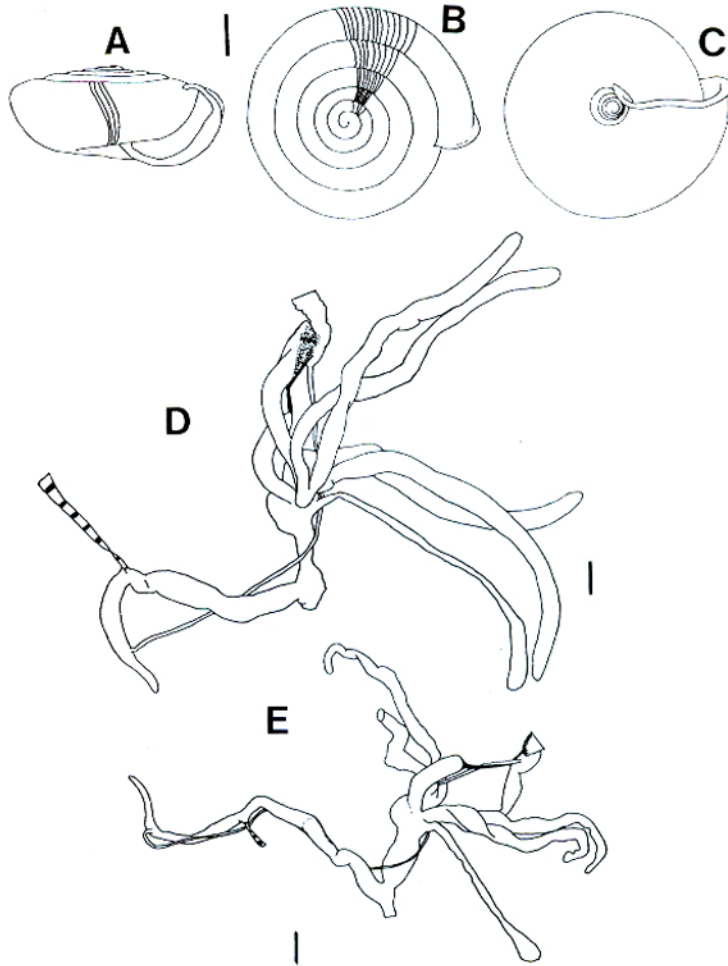


Fig. 2 *Suboestophora boscae* (Hidalgo, 1869). Martínez-Ortí coll. MVHN A-C Shell (Quesa, N°123V) Scale bar = 2 mm D Genitalia (Pego, N°130A) E Genitalia (N°123). Scale bar = 1 mm.

GENITALIA

The genitalia of *S. kuiperi* (Figs 1e-g; Table 1) presents a similar morphology to that of *S. boscae* (Figs 2d-e) and measurements that fit in its range of variability. Given the small size of the adult sample examined, it is reasonable that the data of its genitalia appear in the inferior part of this range.

DISTRIBUTION

Fig. 4 indicates the known distribution of *S. boscae*. The map is based upon the samples collected by the authors and on the revisions of published samples by previous authors (see Puente, 1994 and Martínez-Ortí, 1999). As can be seen, the type locality of *S. kuiperi* is found included within the area of distribution of *S. boscae*.

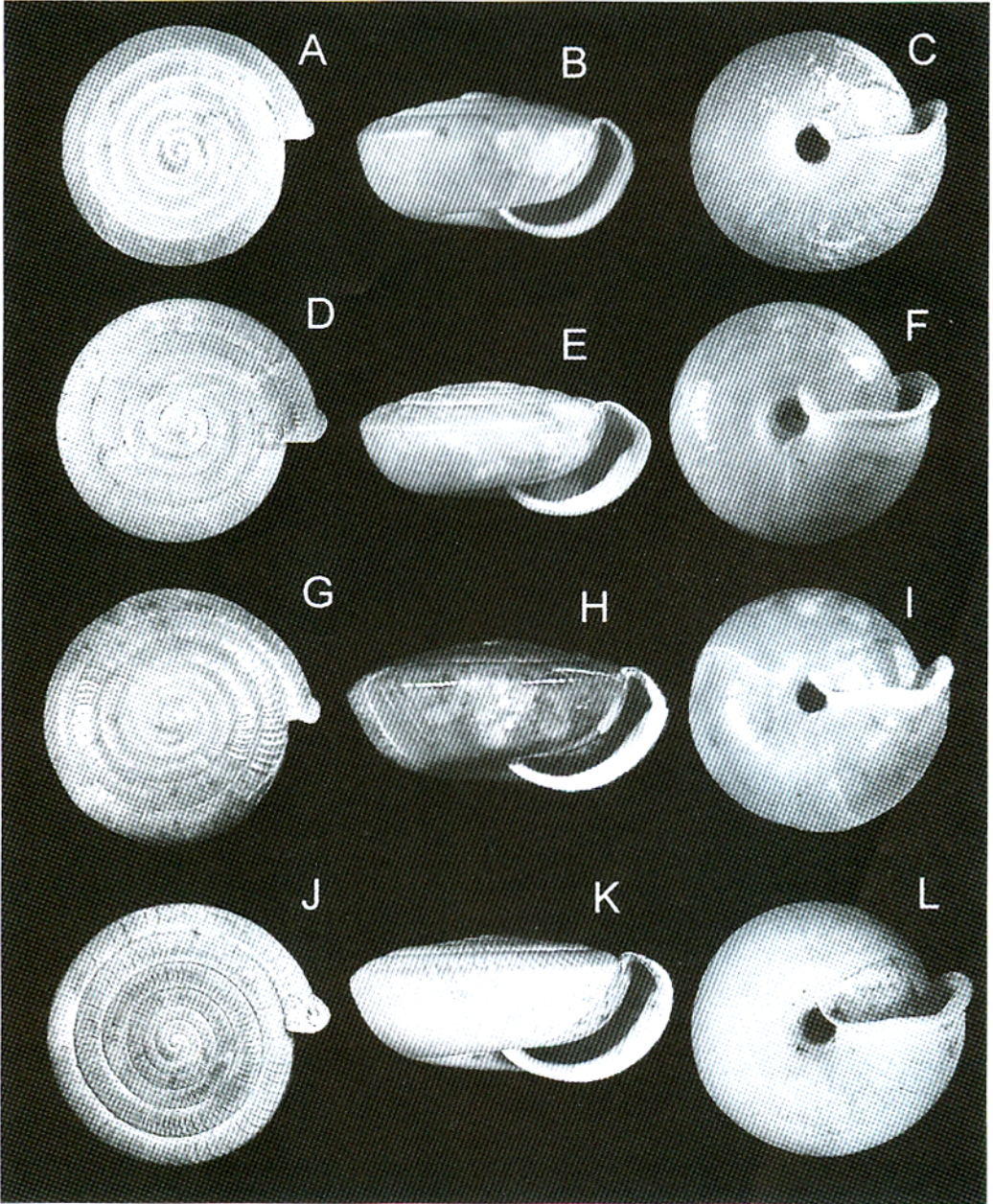


Fig. 3 A–C Lectotype of *Oestophora* (*Suboestophora*) *kuiperi* Gasull, 1966, 9.05 mm diameter D–F *S. boscae*. Martínez-Ortí coll: Quesa (N°123V), 9.2 mm diameter G–I *S. boscae*. Martínez-Ortí coll: Pego (N°130A), 11.8 mm diameter J–L *S. boscae*. Martínez-Ortí coll: Orba (N°66A), 12.6 mm diameter.

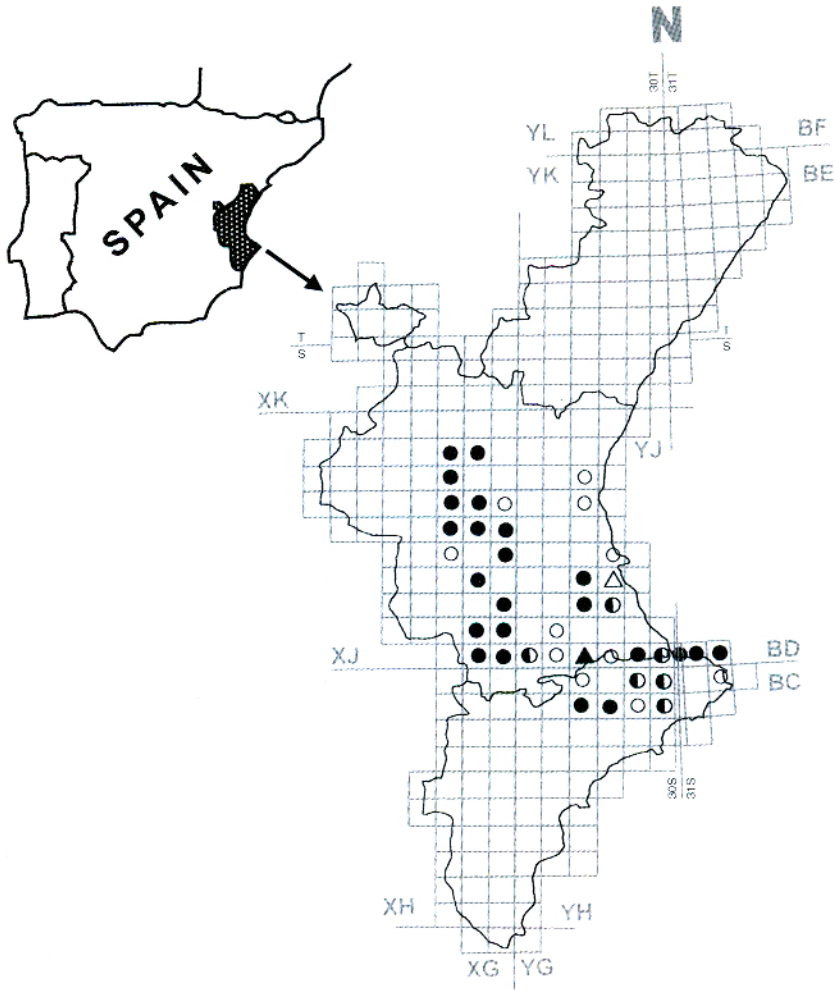


Fig. 4 Geographic distribution of *S. kuiperi* and *S. boscae* (white triangle: locus typicus of *S. kuiperi*; black triangle: locus typicus of *S. boscae*; white circle: quoted localities; black circle: new localities; half black and white circle: both).

CONCLUSIONS

Therefore, and according to our observations on the morphology of the shell and of the genitalia of *S. kuiperi* and its comparison with abundant material of *S. boscae*, we conclude that *S. kuiperi* (Gasull, 1966) should be considered as a junior synonym of *S. boscae* (Hidalgo, 1869), with which it shares the distribution area.

ACKNOWLEDGEMENTS

Thanks to Miguel Villena, curator of the Museo Nacional de Ciencias Naturales of Madrid for the information delivered on the sample type of *S. boscae*, and to Chus del Valle and Dr. Francesc Uribe of the Museu de Zoologia of Barcelona, for the loan of the

samples. Also, to Ernesto Wlasiuk for the translation of this manuscript. This work has been partially financed by the Institut Valencià d'Estudis i Investigació through the CPE/086 project.

REFERENCES

- FISCHER-PIETTE E. 1950 Liste de types décrits dans le *Journal de Conchyliologie* et conservés dans la collection de ce journal *Journal de Conchyliologie* 90: 8-23; 65-82; 149-180.
- GASULL L. 1966 Descripción de un nuevo helícido para la fauna valenciana *Oestophora (Suboestophora) kuiperi* nov. sp. *Boletín de la Sociedad de Historia Natural de Baleares* 12: 159-160.
- GASULL L. 1975 Fauna malacológica terrestre del sudeste ibérico *Boletín de la Sociedad de Historia Natural de Baleares* 20: 5-148.
- HIDALGO J.G. 1869 Description de deux nouvelles espèces d'Helix d'Espagne *Journal de Conchyliologie* 17: 19-21.
- ICZN 1999 *International Code of Zoological Nomenclature* (Fourth ed.) The International Trust for Zoological Nomenclature, London, 306pp.
- MARTÍNEZ-ORTÍ A. 1999 *Moluscos terrestres testáceos de la Comunidad Valenciana* PhD Thesis. Universitat de València. 743pp.
- PRIETO C.E. 1986 *Estudio sistemático y biogeográfico de los Helicidae sensu Zilch, 1959-60 (Gastropoda: Pulmonata: Stylommatophora) del País Vasco y regiones adyacentes* PhD Thesis. Universidad del País Vasco. 393pp.
- PUENTE A.I. 1994 *Estudio taxonómico y biogeográfico de la Superfamilia Helicoidea Rafinesque, 1815 (Gastropoda: Pulmonata: Stylommatophora) de la Península Ibérica y Baleares* PhD Thesis. Universidad del País Vasco. 1,070pp.