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NOTES ON SPANISH NON-MARINE MOLLUSCS 3. CHONDRINIDAE FROM THE CANTABRIAN MOUNTAINS (GASTROPODA: PULMONATA)*

by

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A review is given of the distribution of Chondrinidae species in the Cantabrian Mountains. Few species occur in that area, *Chondrina kobeltoides* being the only endemic. *Chondrina kobelti* and *C. kobeltoides* are discussed and their characters are compared in a table. The taxon *cliendentata* is considered to be a subspecies of *C. kobeltoides* and not of *C. kobelti* as which it was originally described.

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RESUMEN

Se hace una descripción de la distribución y taxonomía de las especies de la familia Chondrinidae que se conocen de la Cordillera Cantábrica (España), en particular las especies *Chondrina kobelti* y *C. kobeltoides*. Gittenberger (1973) describió una subespecie, *C. kobelti cliendentata*, en la cual los dientes palatales se han desplazado con respecto a los dientes parietales y columelares. Durante el estudio de una gran cantidad de material nuevo se evidenció que esta caracteristica es tan variable en las dos especies que no puede ser utilizada como elemento diferenciador. Basado en la semejanza del habitus de la concha y la existencia de formas intermedias el taxon es considerado como subespecie de *C. kobeltoides*. Se presenta unas tablas con las caracteristicas de los taxones, dibujos de unos ejemplares y además mapas de distribución. La especie *Abida vasconica* tiene una distribución amplia en la Cordillera Cantábrica, particularmente en la parte septentrional. Unas especies de la familia Chondrinidae que son muy comunes en la cuenca del Ebro y los Pirineos no aparecen en la Cordillera Cantábrica. Al con-

* 2. New data on the distribution of some species. — Basteria 48: 17-21 (1984).

trario *C. kobeltoides* aparece únicamente en la cordillera. *C. kobelti* y *C. kobeltoides kobeltoides* ocurren solo al norte de la mayor división hidrográfica de la Cordillera Cantábrica y *C. kobeltoides cliendentata* solo al sur de esta. Las Chondrinidae no existen ni al sur ni al oeste de la cordillera por falta de rocas calcáreas.

INTRODUCTION

The Chondrinidae are among the most abundant molluscs living in the Cantabrian Mountains. The number of taxa, however, is very low, in particular in comparison with the nearby Pyrenees. Gittenberger (1973) mentioned three taxa of the genus *Chondrina* Reichenbach, 1828 from the Cantabrian Mountains, viz. *C. kobeltoides, C. kobelti kobelti* and *C. kobelti cliendentata.* He considered the dentition an important character, in particular the "cliendentate" type, with the palatal teeth shifted downward in relation to the parietal and columellar teeth. Most of the material mentioned by Gittenberger is in the Rijksmuseum van Natuurlijke Historie, Leiden. During the last years I collected additional Chondrinidae for study at many localities, in particular at the southern slope of the Cantabrian Mountains. This led to new insight in the systematical and zoogeographical relations between some taxa. For data concerning the systematics and nomenclature of the Chondrinidae in general see Gittenberger (1973), Gomez (1981), Gomez & Angulo (1982) and Gomez & Prieto (1981).

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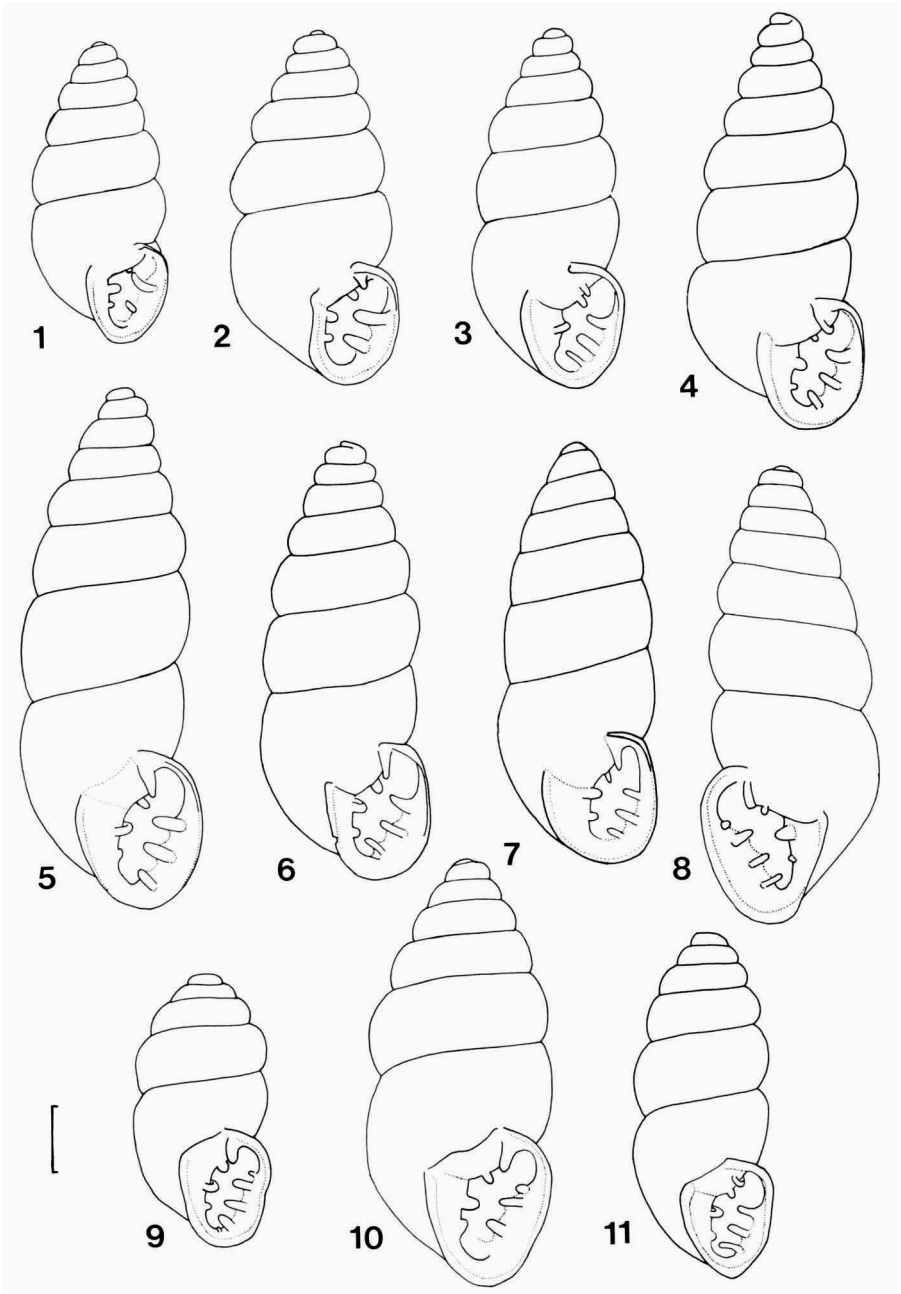
The following abbreviations are used: colln., collection; E, Eikenboom; M, Menkhorst; R, Raven; RMNH, Rijksmuseum van Natuurlijke Historie; V, Vermeulen. For all localities the UTM-1 km-grid code is given.

DESCRIPTION OF THE SPECIES

Chondrina kobelti (Westerlund, 1887)
(figs. 9-12)

New records. — ASTURIAS: SW of Agüerina, QH2289 (R); 1.5 km NNW of Páramo, QH4077 (R); 3 km NNE of La Plaza, QH3784 (R); Desfiladero de la Paraya, TN9071 (R); Santillán, UN2693 (M); Tornin, S of Cangas de Onís, UN2798 (M); 2 km NW of Cenaya, UN2990 (M); Beyos, Desfiladero de los Beyos, UN3087 (M); Ribadesella, UP3314 (M); Lago Enol, UN3793 (R); Lago de la Ercina, UN3992 (R); 2 km S of Arenas de Cabrales, UN5194 (R); Buelles,



Figs. 1-6. *Chondrina kobeltoides cliendentata* Gittenberger, 1973. 1, short form, W of Acevedo (León), UN2467; 2, short form, Oceja de Valdellorma (León), UN2043; 3, "typical" form, W of Acevedo (León), UN2467; 4, teeth opposed, Piedrasecha (León), TN7245; 5, abnormally long specimen, Caldas de Luna (León), TN6558; 6, teeth opposed, Caldas de Luna (León), TN6558. Figs. 7-8. *Chondrina kobeltoides kobeltoides* Gittenberger, 1973. 7, 8, 1.5 km N of Lebeña (Santander), UN7187; 7, cliendentate; 8, sinistral, cliendentate. Figs. 9-11. *Chondrina kobelti* (Westerlund, 1887). 9, normally sized, cliendentate, with a basalis, Lago Enol (Asturias), UN3793; 10, abnormally large, cliendentate, Lago Enol (Asturias), UN3793; 11, long, slender, cliendentate, Oseja de Sajambre (León), UN3380. Scale 1 mm.

UN7599 (E); Puentelles, UN7095 (E,M); El Mazo, 5 km E of Panes, UN7498 (R); Estragüeña, UN6994 (R,V); 3.5 km SSW of Panes, UN7095 (R); S of Unquera, UP7703 (R); N of Pendueles, UD6706 (R); 5 km SSW of Panes, UN6894 (R); LEON: Oseja de Sajambre, UN3380 (M,R); Caín-Cordiñanes, UN4583-4585 (R); Desfiladero de los Beyos, border Asturias-León, UN3180 (R); SANTANDER: 1 km NW of Cillorigo-Castro, UN7184 (R); 1.5 km N of Lebeña, UN7187 (R); 1 km NW of La Hermida, UN6891 (R); Mirador del Cable, N of Fuente Dé, UN5379 (R); La Lastra, 2 km N of Pantano de la Cohilla, UN8878 (V); 2 km S of Celis, UN8493 (V); 1 km S of Mirones, VN4393 (M); Portilla de la Sia, VN5378 (E,M); 3 km NW of Portilla de la Sia, VN5280 (R); nacimiento del Gándara, VN5282 (R); Cascadas del Asón, VN5284 (R); 1 km S of Arredondo, VN5190 (M); 1 km N of Ramales de la Victoria, VN6290 (M); BURGOS: Las Machorras, VN5274 (E,M); VIZCAYA: just S of Durango, WN2978 (M).

The dentition is more variable than indicated by Gittenberger (1973: 170, 171) for *C. "kobelti kobelti"*. Generally the specimens are not cliendentate, but in some populations this type of dentition occurs, e.g. at Oseja de Sajambre (fig. 10). The suprapalatalis is weak or absent, a basalis occurs only in a few specimens (fig. 9). In a sample from Lago Enol a "giant" specimen was found (fig. 11), which is ⅓ higher and wider than the other specimens of the population; this is due to the development of nearly an entire extra whorl, maybe caused by an infection with parasites.

The species is known from the northern slope of both the Cantabrian and the Bask Mountains, from Asturias in the West to the Sierra de Aralar in the East (fig. 12). In the eastern part of its range *C. kobelti* is sympatric with *C. avenacea* (Bruguière, 1792) (Gittenberger, 1973: 173). The species was found between 30 and 1950 m altitude.

Chondrina kobeltoides Gittenberger, 1973

Discussion. — Gittenberger (1973: 173-175) considered the *Chondrina* from the southern slope of the Cantabrian Mountains a subspecies of *C. kobelti*. A population from Felmín (province of León) was considered intermediate between *C. "kobelti kobelti"* and *C. "kobelti cliendentata"*, and was provisionally included in the nominate subspecies. Gittenberger considered the cliendentate teeth a typical character of his *cliendentata*. Additional material, however, now demonstrates that cliendentate and non-cliendentate specimens may occur within a single population, whereas cliendentate specimens may be found in both *C. kobelti* s. str. (sensu Gittenberger, 1973) and *C. kobeltoides*.

More useful characters are the shape and the dimensions of the shell. Specimens of typical *kobelti* are rather small, with a comparatively large body whorl and equally broad penultimate whorl, whereas shells belonging to the taxa *kobeltoides* and *cliendentata* are larger and more slender, with whorls increasing more gradually in size (see table 1). Using these characters, the

population from Felmín should be classified with *cliendentata*, which proves to be the only *Chondrina* taxon represented at the southern slope of the Cantabrian Mountains. Nowhere *cliendentata* is found with *kobeltoides* but often *kobeltoides* and *kobelti* occur together. Although intermediate populations are expected to exist between subspecies, all populations known clearly belong to either *kobelti* or *cliendentata*. It is much more difficult to distinguish the latter from *kobeltoides*; near the water divide in the Cantabrian Mountains both are most variable and intermediate populations occur, e.g. at Cordiñanes-Cain (fig. 7). Comparing the three taxa (table 1), the allopatric *kobelti* and *cliendentata* appear as two extremes with *kobeltoides* (sympatric with *kobelti*) as an intermediate taxon. Since intermediate forms between *kobeltoides* and *cliendentata* occur, I consider *cliendentata* a subspecies of *C. kobeltoides*, giving priority to the latter of these two simultaneously published names.

character	*kobelti*	*kobeltoides*	*cliendentata*
colour shell	dark violet brown	dark violet brown to dark corneous	dark corneous
colour aperture	chocolate brown with light brown to white teeth and lip	chocolate brown with pale brown or white teeth and lip	pale to dark brown with white teeth and lip
surface structure	fine, regular or slightly irregular riblets	rather smooth with fine regular growth lines	irregular riblets
height	3.7-5.1-6.7 mm	5.6-7.0-8.5 mm	5.2-6.3-8.3 mm
width	1.8-2.1-2.6 mm	2.2-2.6-3.1 mm	2.3-2.5-2.8 mm
number of whorls	5¼-6.2-7½	6½-7.3-8¼	6¼-7.3-8¼
convexity whorls	convex	strongly curved	strongly curved
top whorls	wide	narrow	narrow
shape shell	short, broad	long, slender	long, rather slender
aperture	narrow	narrow	wide
shape aperture	generally V	generally V	generally U
position palatal teeth/columellar-parietal teeth	generally opposite	opposite or slightly cliendentate	generally cliendentate
infrapalatalis	+	+	+(-)
suprapalatalis	+(-)	+	-(+)
infracolumellaris	+	+	+/-
basalis	-(+)	-	-
dentation	strong	strong	generally weak
lip	strongly enforced	strongly enforced	weak
radula (number of lateral teeth)	39-47	38-41	25-37

Table 1. Comparison between characters of *Chondrina* taxa. The middle number is the average value of the measurements. The presence or absence of particular teeth is indicated: +, present; −, absent; (+), present in few specimens; (−), absent in few specimens; +/−, may be present or absent.

Chondrina kobeltoides kobeltoides Gittenberger, 1973
(figs. 7, 8, 13)

New records. — ASTURIAS: 2 km SW of Arenas de Cabrales, UN5194 (R); Lago Enol, UN3793 (R); Lago de la Ercina, UN3993 (R); N of La Foz de Morcín, TN6693 (R); 3 km NNE of La Plaza, QH3784 (R); SW of Agüerina, QH2389 (R); Beyos, Desfiladero de los Beyos, UN3087 (M); Ribadesella, UP3314 (M); LEON: Desfiladero de los Beyos, border Asturias-León, UN3180 (R); Oseja de Sajambre, UN3380 (M,R); Caín-Cordiñanes, UN4583-4585 (R); SANTANDER: W of Cosgaya, UN5974-5874 (E,M,R); 1.5 km N of Lebeña, UN7187 (R).

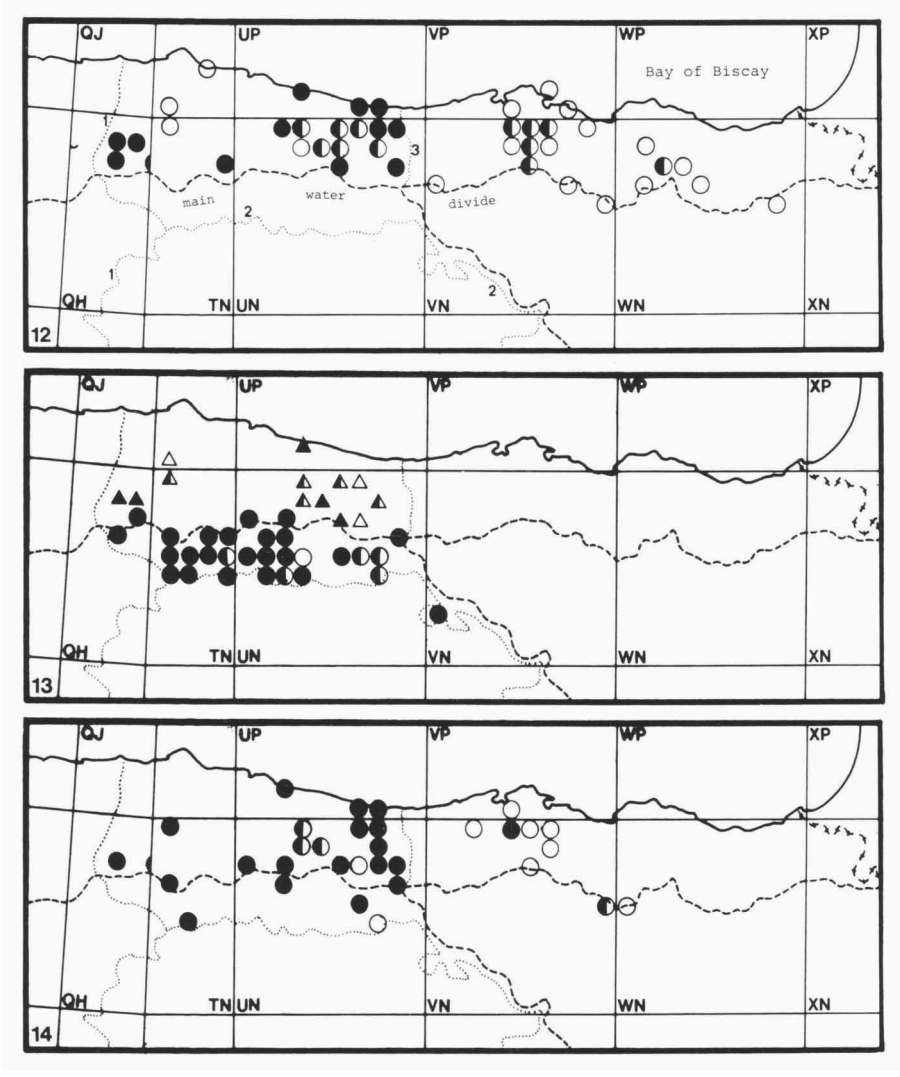
Generally this subspecies was found at localities where *C. kobelti* occurs too. Often both taxa were found represented on the same rock, sometimes completely mixed, but at many places *C. kobeltoides kobeltoides* prefers the shaded rocks and *C. kobelti* the more sunny parts (Gittenberger, 1973: 180). This is not in accordance with the distribution of *C. kobeltoides cliendentata*, which is particularly common at the southern slope of the Cantabrian Mountains, which has a dry and sunny climate. One sinistral specimen was found (fig. 8).

This subspecies occurs only at the northern slope of the Cantabrian Mountains, from 250 to 1100 m altitude (fig. 13).

Chondrina kobeltoides cliendentata Gittenberger, 1973 comb. nov.
(figs. 1-6, 13)

Material. — Holotype: near Sahelices de Sabero, León, UN24 (RMNH, originally indicated as Sallices de Sabero). Paratypes: locus typicus (RMNH); Remolina-Cistierna, León, UN35 (RMNH); San Martín de los Herreros, Palencia, UN75 (RMNH); San Martin de los Herreros-Rebanal de las Llantas, Palencia, UN65 (RMNH, originally indicated as San Martin de los Hamamos-Rebanal de las Llantes); Cervera de Pisuerga, Palencia, UN74 (Senckenberg Museum, Frankfurt). Other material: Felmín, León, TN95 (RMNH, originally mentioned as *C. kobelti kobelti*, intermediate form with *cliendentata*).

New records: ASTURIAS: Puerto de San Isidro-Felechosa, UN0271 (R); Puerto de la Cubilla, TN6363 (R); Lago Cueva, 13 km SE of Pola de Somiedo, QH3670 (R); 1.5 km S of Valle del Lago, QH2771 (R, RMNH); 0.8 km W of Riospaso, TN6567 (R); LEON: Lumajo, QH2362-QH2463 (R); La Cueta-Quejo, QH2863 (R); Mallo, TN6351 (R); Caldas de Luna, TN6558 (R, RMNH); 1.2 km N of Piedrafita, TN8866 (R); 2 km NNE of Los Barrios de Luna, TN6749 (R, RMNH); Piedrasecha, TN7245 (R); Geras, TN7451-7452 (R); Beberino, TN8051 (R); 0.5 km NE of Pendilla, TN8068 (R); Las Hoces de Valdeteja, UN0455 (R, RMNH); Las Hoces de Vegacervera, TN9254 (R, RMNH); Matallana estación, TN9457 (R, RMNH); Valdeteja, UN0356 (R); Nocedo de Curueño, UN0452 (R); 2.5 km SE of Genicera, TN9856 (R); Puerto de Vegarada, TN9868 (R); 1 km W of Aviados, TN9948 (R); E of Embalse del Porma, UN1555 (R, RMNH); Pico Grande near Valdehuesa, UN1155-UN1255 (R); E of Valdecastillo, UN1153 (R); San Adrián, 4 km SSE of Boñar, UN1145 (R); 1.5 km SSE of Puebla de Lillo, UN1563 (R); 1.5 km WSW of Maraña, UN2168 (R); W of Acevedo, UN2467 (R); Valle de Valdosín, 3 km NW of La Uña, UN2472 (R); 1.5 km SW of Veneros, UN1544 (R); N of Oceja de Valdellorma,



Figs. 12-14. Records of Chondrininae, indicated on UTM 10 km square maps; the thick, interrupted line indicates the main water divide, which constitutes an important zoogeographical border line, whereas the stippled lines stand for the other zoogeographical boundaries: (1) the boundary between non-calcareous rocks in the West and calcareous rocks in the East, (2) the limitation of the Castilian uplands, and (3) the boundary running from Comillas to the Pico Tres Mares. UTM squares reported about in the literature are indicated by open symbols, if reconfirmed by the present author half-open symbols are used; fully black dots or triangles denote new records. 12, *Chondrina kobelti*; 13, *C. k. kobeltoides* (triangles) and *C. k. cliendentata* (dots); 14, *Abida vasconica*, which is also known from one locality in the province of Zaragoza (Gittenberger, 1973: 152).

UN2043 (R); S of La Herrera, 2 km W of Sabero, UN2243 (R); SE of Sahelices de Sabero, UN2344 (R); 2 km NW of Cistierna, UN2442-UN2542 (R); E of Cistierna, UN2641 (R); 2 km SSE of Fuentes de Peñacorada, UN3043 (R); NW of Robledo de Guzpeña, UN3342 (R); 1.5 km NE of Ocejo de la Peña, UN3049 (R); Santa Olaja de la Varga, UN2745-UN2846 (R); NE of Aleje, UN2747-UN2748 (R); N of Aleje, UN2647 (R); Valdoré, UN2349 (R); Pico Aguasalio, E of Crémenes, UN2749-UN2750 (R, RMNH); 1 km N of Crémenes, UN2553 (R); 1 km SE of Argovejo, UN2851 (R); 3 km ESE of Argovejo, UN3051 (R); N of Portilla de la Reina, UN4969 (R); PALENCIA: San Martín-Rebanal de las Llantas, UN6850 (V); 2 km NW of Triollo, UN6155 (V); Santibañez de Resoba-Triollo, UN6753 (V); 2 km E of Santibañez de Resoba, UN7053 (V); Cardaño de Arriba-Cardaño de Abajo, UN5656 (R); Puerto de Camporredondo, SW of La Lastra, UN6252 (V); 1 km SSW of San Martín de los Herreros, UN7049 (R); Ventanilla, UN7248 (R); Ruesga lake, UN7447 (R); Ruesga, UN7547 (V); 4 km SW of Cervera de Pisuerga, UN7544 (V); Pico de los Pilones, SW of Cervera de Pisuerga, UN7445 (V); 0.2 km W of Vado, near Cervera de Pisuerga, UN7946 (V); Puerto de Ruesga, UN7350 (V); 1 km E of Rebanal de las Llantas, UN6850 (V); 2 km WSW of Vidrieros, UN6654 (V); 2 km S of La Lastra, UN6452 (V); 1 km S of Piedrasluengas, UN8165 (V); BURGOS: Peña Amaya, N of Amaya, VN0423 (R, RMNH).

This subspecies has to be redescribed. It is characterized by a dark corneous, rather slender shell, which has a conical apex and rather coarse, irregular ribs. Generally the aperture is U-shaped and wide, with a thin lip.

Shell. — The dark corneous shell (figs. 1-6) has a more or less conical apex. The 6¼ to 8¼ convex whorls are sculptured with rather coarse, irregular riblets. The thin lip of the wide aperture is not reflected. In most specimens the aperture is U-shaped. The dentition is not very strong. Always a parietalis, a columellaris, a palatalis inferior and a palatalis superior are well-developed, and in many specimens a weak infracolumellaris is also present. In addition there may be a weak angularis or a suprapalatalis and, very rarely, a weak infrapalatalis. The shell has a sharp keel at its base; the last quarter of the body whorl is strongly flattened obliquely and generally there is a notch opposite the infrapalatalis. Shell height 5.2-8.3 mm, width 2.3-2.8 mm.

The percentage of cliendentate specimens varies among the populations

taxon	locality	teeth
kobelti	Desfiladero de la Hermida (Santander)	42, 43, 44 (Gittenberger, 1973)
	N of Lebeña, Desfiladero de la Hermida (Santander)	44, 44, 47
	Santoña (Santander)	43, 44 (Gittenberger, 1973)
	Desfiladero de la Paraya (Asturias)	39, 39, 40, 41
kobeltoides	Desfiladero de la Hermida (Santander)	38, 38, 41 (Gittenberger, 1973)
cliendentata	Amaya (Burgos)	25, 27, 31, 32, 32, 32, 33, 34, 34, 37
	La Uña (León)	32, 35, 36
	Los Barrios de Luna (León)	28, 29, 30, 30, 30, 32, 32

Table 2. Numbers of teeth on each side of the central tooth in the radula of *Chondrina* taxa (counted using a light microscope).

from about 50% to 100%. For example in a population from north of Yugueros (near the locality from where the subspecies was described originally) all specimens are cliendentate. This is true for many populations along the southern extreme of the Cantabrian Mountains, but in many other populations only part of the specimens are cliendentate. Often it is not possible to decide exactly whether a specimen is cliendentate or not because the teeth may be shifted only a little.

In several populations very large specimens occur which have extra whorls, maybe due to infection with parasites (fig. 6).

Genitalia. — See Gittenberger (1973: 174-175).

Radula (table 2). — The radula has narrow teeth in the middle, with one cusp only, and more marginal teeth which are broader, with more cusps. At each side of the central tooth there are 27 to 37 teeth, about one third of them belonging to the broader type. Breure & Gittenberger (1982) mentioned that radulae with central teeth with one cusp are typical for rock-scraping terrestrial molluscs.

Distribution (fig. 13). — The subspecies is extremely common along the southern slope of the Cantabrian Mountains, from NW León to the northern part of the province of Burgos, everywhere where limestone or carbonaceous rocks are exposed. The subspecies occurs also at some localities just north of the main water divide of the Cantabrian Mountains. It lives on bare rock, generally exposed to sunshine, and below stones, between 900 and 1850 m altitude.

Chondrina avenacea (Bruguière, 1792)

This species is widely distributed in the northwestern part of the Iberian peninsula (Gittenberger, 1973; Gomez, 1981; Gomez & Angulo, 1982), but is not known from the southern slope of the Cantabrian Mountains or from along the coast W of Santander. Some specimens were found in a sample from N of Pendueles (Asturias, UP 6706; R).

Abida bigerrensis (Moquin-Tandon, 1856)

This species is known from one locality in the area under consideration: near Lago Enol (Asturias) (Gittenberger, 1973). I did not find *A. bigerrensis* near Lago Enol nor elsewhere in the Cantabrian Mountains.

Abida vasconica (Kobelt, 1882)
(fig. 14)

New records. — LEON: Oseja de Sajambre, UN3380 (R); Caín-Cordinanes, UN4583-UN4585 (R); W of Acevedo, UN2467 (R); 1.5 km WSW of Maraña, UN2168 (R); Valle de Valdosín, 3 km NW of La Uña, UN2472 (R); Los Barrios de Gordón, TN7848 (R); PALENCIA: Santibañez de Resoba-Triollo, UN6753 (V); 2 km WSW of Vidrieros, UN6654 (V); 2 km S of La Lastra, UN6452 (V); 1 km S of Piedrasluengas, UN8165 (V); ALAVA: 2 km N of Puerto de Orduña, VN9856 (R); SANTANDER: Mirones, VN4394 (E); 1.5 km N of Lebeña, UN7187 (R); Mirador del Cable, N of Fuente Dé, UN5379 (R, RMNH); 3 km E of Pasaguero, UN7771 (V); W of Abanillas, UP7900 (V); La Lastra, 2 km N of Pantano de la Cohilla, UN8878 (V); ASTURIAS: Estragüeña, UN6994 (R); 3.5 km SSW of Panes, UN7095 (R); 5 km SSW of Panes, UN6894 (R); N of Pendueles, UP6706 (R); Buelles, UN7599 (E); Puentelles, UN7095 (E); Lago Enol, UN3793 (R); Lago de la Ercina, UN3992 (R); La Torre, UP2715 (R, RMNH); 0.8 km W of Riospaso, TN6567 (R, RMNH); N of La Foz de Morcín, TN6693 (R); Santa Eulalia de Morcín, TN6695 (R); 1.5 km NNW of Páramo, QH4077 (R); 1.5 km S of Valle del Lago, QH2771 (R); Puerto de San Isidro-Felechosa, UN0271 (R).

Gittenberger (1973) disposed of material from only a few localities in the Cantabrian Mountains. The species, however, is widely distributed in this area, but mainly N of the main water divide, where it occurs between 30 and 1950 m altitude. Only few populations are known from the area S of the water divide, generally at high altitudes (1275-1500 m), at localities with a high precipitation (fig. 14). The species occurs farther W than indicated by Gittenberger, thus enlarging the area from where the genus *Abida* is known. While the *Chondrina* species live attached to bare carbonate rock, often in the sun, *Abida vasconica* is found between vegetation on carbonate rock and on bare rock at shaded and humid places, for example under protruding limestone beds.

ZOOGEOGRAPHICAL NOTES

In the Ebro valley, the Bask Mountains and the Iberian Cordillera, even very close to the studied area, Chondrinidae species occur which do not live in the Cantabrian Mountains, viz. *Granopupa granum* (Draparnaud, 1801), *Granaria braunii* (Rossmässler, 1842), *Chondrina ripkeni* Gittenberger, 1973, *Chondrina ascendens* (Westerlund, 1878), *Abida attenuata* (Fagot, 1886) and *Abida polyodon* (Draparnaud, 1801) (see maps in Gittenberger, 1973; Gomez, 1981; Gomez & Prieto, 1981 and Gomez & Angulo, 1982). Except for *C. ripkeni*, these species are widely distributed in the Ebro valley and in the Pyrenees, which have a warmer and drier climate.

There is a zoogeographical boundary E of the Cantabrian Mountains, passing from the coast near Comillas (province of Santander) to the Pico Tres

Mares and along the water divide between Ebro and Duero (fig. 12). Most Chondrinidae species occur only E of this boundary. ***Chondrina kobeltoides***, however, occurs only W of it (fig. 13). The distribution of the Chondrinidae is limited in the S by the dry and hot Castilian uplands (the "Meseta"), where limestone rock does not occur and in the W by the metamorphic Proterozoic and Palaeozoic rocks of Galicia and El Bierzo, where limestone is nearly absent. Another zoogeographical boundary is formed by the main water divide of the Cantabrian Mountains and the Bask Mountains. *C. kobelti* occurs only N of the water divide (fig. 13) as does *C. kobeltoides kobeltoides* (fig. 13). *C. kobeltoides cliendentata* is mainly restricted to the southern slope of the mountains, with few localities just N of the water divide (fig. 13).

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