

CHYDORUS PIZARRI SP. NOV. A NEW CHYDORID (CLADOCERA) FROM WESTERN SPAIN

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ABSTRACT

Chydorus pizarri differs from the other species of *Chydorus* in having a series of chitinous excrescences in the preanal margin of the postabdomen, never noticed before in any Chydorinae or Aloninae. Other important morphological characteristics are, in the female: no divided tip of rostrum, five setae in the endopodite of the antenna and a sharp bend in the dorsal outline of the ephippium. In the male: the copulatory hook strongly tapered distally and the shape of the postabdomen similar to that of the female.

The new species inhabits temporary fresh water bodies, and its geographical distribution is, up to now, restricted to the westernmost steppic regions of the Iberian Peninsula.

INTRODUCTION

A very interesting species of *Chydorus* has been found in some localities in western Spain. It has morphological features seldom observed among the species of the genus, as the presence of five setae in the endopodite of the antenna and a sharp dorsal bend. Moreover, it has a series of chitinous excrescences in the preanal margin of the postabdomen; this character is surprising since it never was noticed hitherto in any *Chydorinae* or *Aloninae*.

The present paper describes this taxon as the new species *Chydorus pizarri*, based on parthenogenetic females, ephippial females, and immature and mature males. Information about its geographical distribution and autoecology is included, and speculations are made about the origin of its restricted distribution in this part of Spain.

MATERIALS AND METHODS

Material examined: 1) 60 specimens from Grande de Albuera lagoon, La Albuera, Badajoz~collected in April 1979; 2) 40 specimens

from El Grullo lagoon, Las Ventas de San Julián, Toledo, collected in April 1986 A.F. Lop leg; 3) 120 specimens from Fonfría pool, Fonfría, Zamora, collected in March 1986; 4) 7 specimens from Sedana lagoon, Santa María del Monte Cea, León, collected in March 1986.

Parthenogenetic females, ephippial females, and both immature and mature males were used in this taxonomic study. A camera lucida was used for the drawings. The SEM photographs were done with a Cambridge S 250 MK2 Stereoscan at 10 KV.

CHYDORUS PIZARRI N. SP.

Derivatio nominis or etymology. The origin of this new species is Extremadura, cradle of several important Spanish conquerors. The new species is dedicated to Francisco Pizarro, conqueror of Perú.

Type series. All the specimens collected in the Laguna Grande de Albuera in April 1979.

Type locality. Laguna Grande de Albuera, La Albuera, Badajoz. Geographical coordinates: 6' 45' W, 38' 41' N. Altitude 288 m. The lake surface area is approximately one-half square kilometer

and is inundated from November to June. The substrate is clayish and the water is only slightly mineralized (0.38 meq/l total alkalinity, 29 mg/l Cl, and 19 mg/l $\text{SO}_4^{=}$). Macrophytic vegetation is scarce (*Ranunculus*, *Isoetes*, *Marsilea*) due to water turbidity.

Holotype. An ephippial female 0.4 mm in length preserved in 4 % formalin with glycerol has been deposited in the Department of Ecology, Barcelona University, Catalog number E. M. A. H 005.

Paratypes. Ten parthenogenetic females, two males, and one ephippial female preserved in 4 % formalin have been deposited in the collection of the Department of Ecology, Barcelona University.

Diagnosis. Female: Body subglobular and dark brown. Dorsal profile frequently with a sharp bend near the head-shell junction. Rostrum ends in a sharp point. Antennule with two lateral aesthetascs. Antennal formula 0-0-3 (1)/1-1-3 (1). Labrum has a clubbed tip. The entire valve surface is reticulated; the ventral margin without setae on the ventral bulge. The postabdomen is short with the anal groove longer than the postanal portion and with long, fine, very sharp marginal denticles, in pairs, from the preanal angle to the tip; the preanal margin has characteristic chitinous excrescences. Male: Antennule with 11 aesthetascs; copulatory hook sharp at the tip. Postabdomen very similar to that of the female.

Description

Parthenogenetic female (figs. 1a, 1b, 3a):

General aspect. Laterally, the body is approximately as long as high. The dorsal border can be uniformly arched or have a sharp bend at the level of the union of the headshield with the valves. The posterior-dorsal angle is well marked. The ventral margin is widely rounded with a slight bulge at the midpoint. Seen from above the body length is twice the width; the profile of the valves is regularly curved along its entire length, with the maximum width in the posterior third.

Head. The outline at the ecdysial line is elliptical (figs. 2a, 2b). The fornices are prominent and the

rostrum is rather short and ends in a sharp point (fig. 2e). The headpores are connected by a well marked chitinous stria that includes the two secondary pores (figs. 2c, 3b). The interpore distance (IP) is less than (60-70 %) the distance between the posterior pore and the posterior margin of the headshield (PP). The secondary pores are somewhat closer to the anterior pore than to the posterior pore. The entire surface is reticulated in the same fashion as the valves (figs. 2d, 3g). Laterally seen, the compound eye is ovoid with long axis perpendicular to head margin. The diameter of the ocellus is approximately one half the length of the long axis of the eye (fig. 1a).

Antennule (figs. 1c, 3c). It is flattened in the anterior-posterior direction. Frontally, its shape is rhomboidal. The aesthetascs are approximately one half the length of the antennule; six are inserted in terminal position, one subterminal, and the remaining two lateral. The antennular seta arises in medial position. The tips of the aesthetascs do not reach the tip of the rostrum.

Antenna (fig. 2h). Formula 0-0-3 (1)/1-1-3 (1). The basal segments are longer than the distal ones, and that of the exopodite is enlarged at the internal medial section. The basal segment of the endopodite has a very thin seta that does not reach the tip of the distal segment. The seta of the medial segment of the endopodite reaches the tip of the two longest setae of the terminal segment and is twice the length of the shortest seta of this segment. The terminal segment of the exopodite has two setae with the same length as the longest setae of the endopodite and one that is somewhat shorter. Terminal spine of both branches very small.

Labrum (figs. 2f, 2g). The tip ends in a finger like process. The anterior-proximal portion has a well developed, rounded keel situated between the antennules and very close to the rostrum. At the base of the keel and at each side are two small depressions (apodemes of the dilators of the esophagus, see SMIRNOV 1971).

Shell. Meshes cover practically the entire surface (fig. 3a). The meshes are more pronounced in the ventral section than in the dorsal section; the dorsal meshes can have a sinuous outline (fig. 1a). The ventral series of submarginal setae are interrupted at the ventral bulge (fig. 2i). The anterior group has 10-12 setae and the posterior

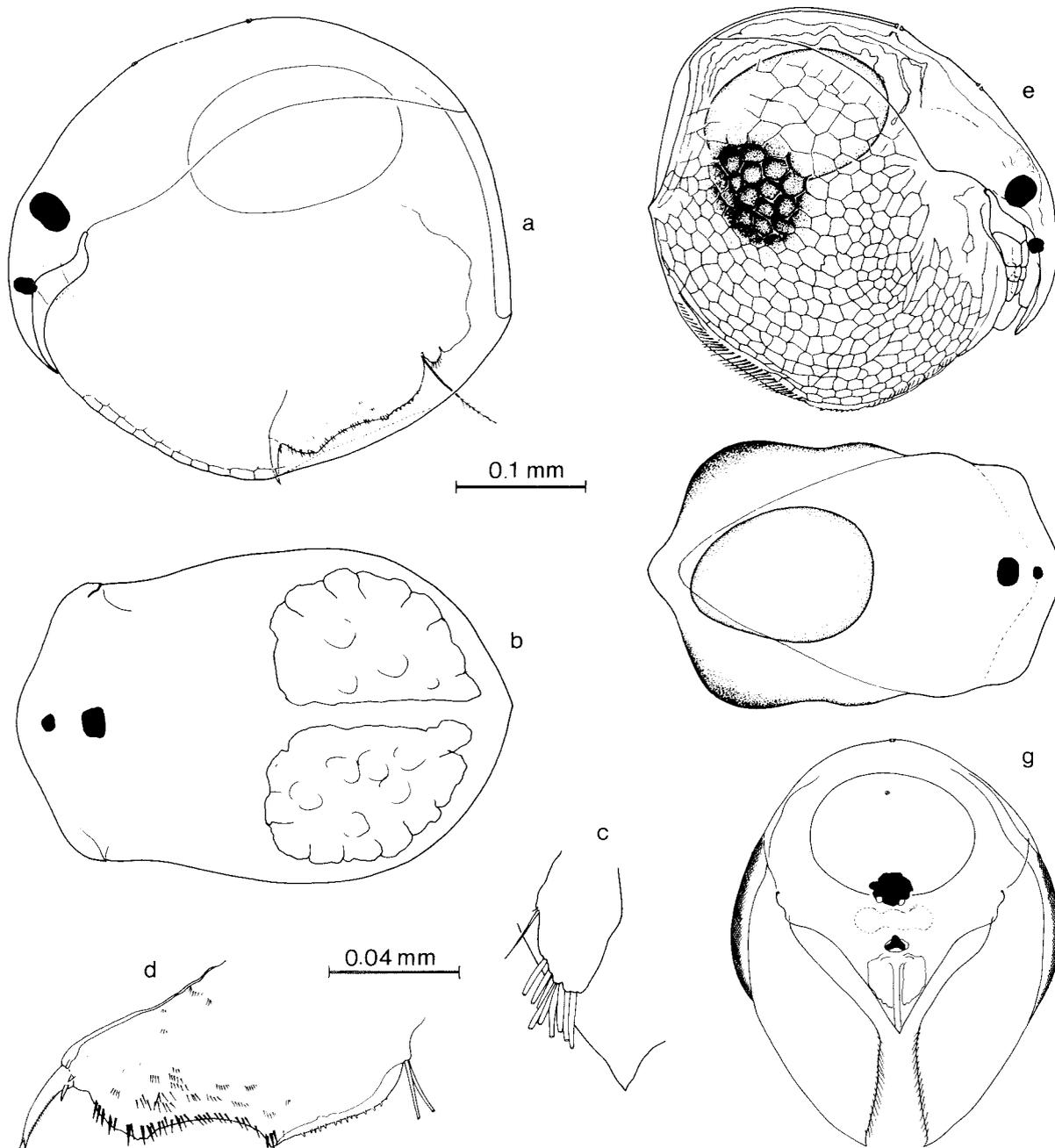


Figure 1.- *Chydorus pizarri* n. sp. from Laguna de Albuera. Parthenogenetic female: a, lateral view; b, dorsal view; c, antennule and rostrum; d, postabdomen. Ehippial female: e, lateral view; f, frontal view; g, dorsal view.

Chydorus pizarri n. sp. de la laguna de Albuera. Hembra partenogénica: a, vista lateral; b, vista dorsal; c, anténula y rostrum; d, postabdomen. Hembra ehipial: e, vista lateral; f, vista frontal; g, vista dorsal.

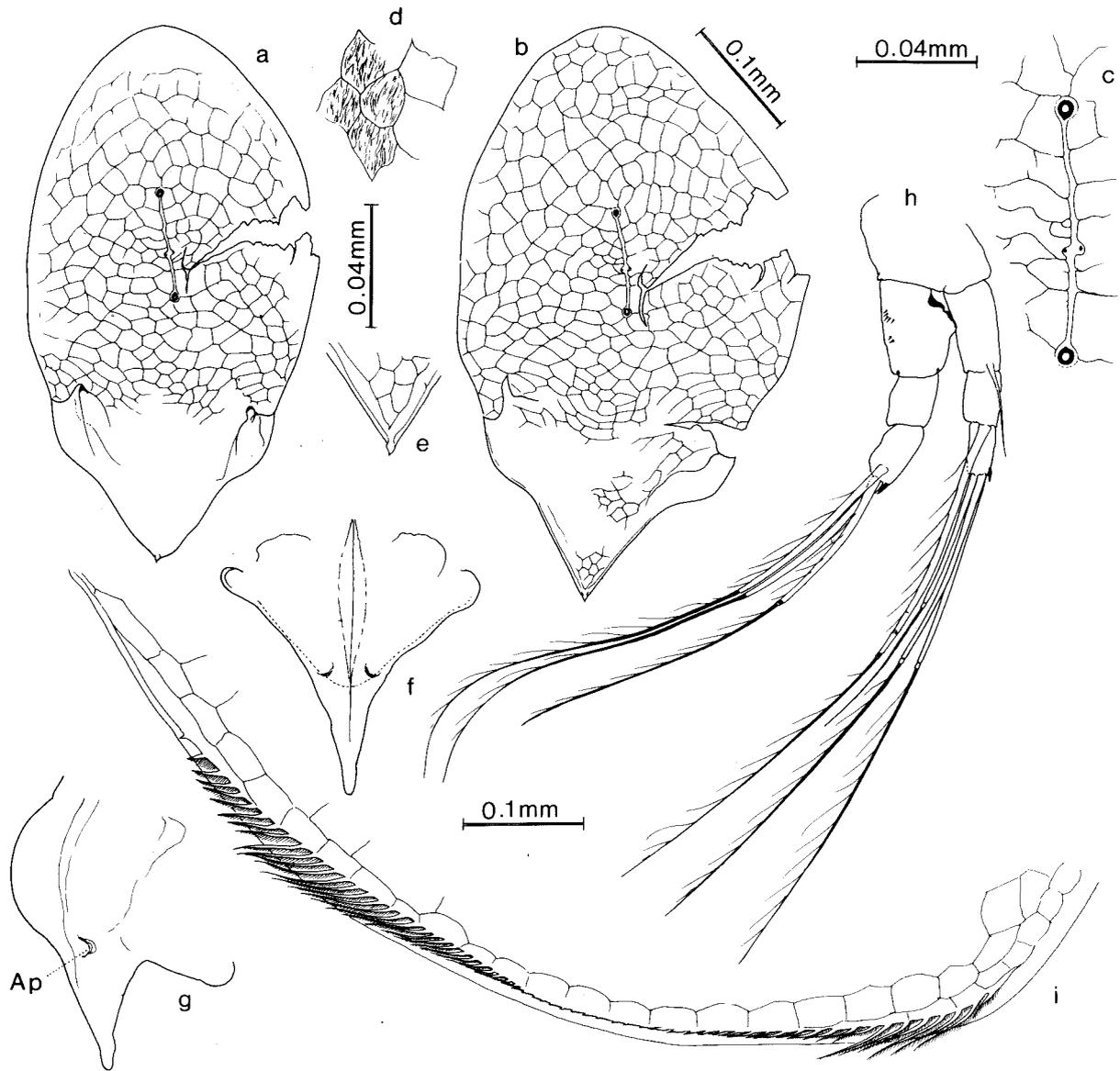


Figure 2.- *Chydorus pizarri* n. sp. from Laguna de Albuera. Parthenogenetic female: a, headshield; b, the same headshield flattened by the coverslip; c, head pores; d, internal sculpturing of the meshes on shell; e, rostrum; f-g, frontal and lateral view of the labrum (Ap, apodemes of the dilators of the esophagus); h, antenna; i, ventral setation of the shell.

Chydorus pizarri n. sp. de la laguna de Albuera. Hembra partenogénica: a, yelmo cefálico; b, el mismo yelmo cefálico aplastado por el cubreobjetos; c, poros cefálicos; d, ornamento interno del retículo de las valvas; e, rostrum; f-g, vista frontal y vista lateral del labro (Ap, apodemas de los dilatores del esófago); h, antena; i, sedas ventrales de las valvas.

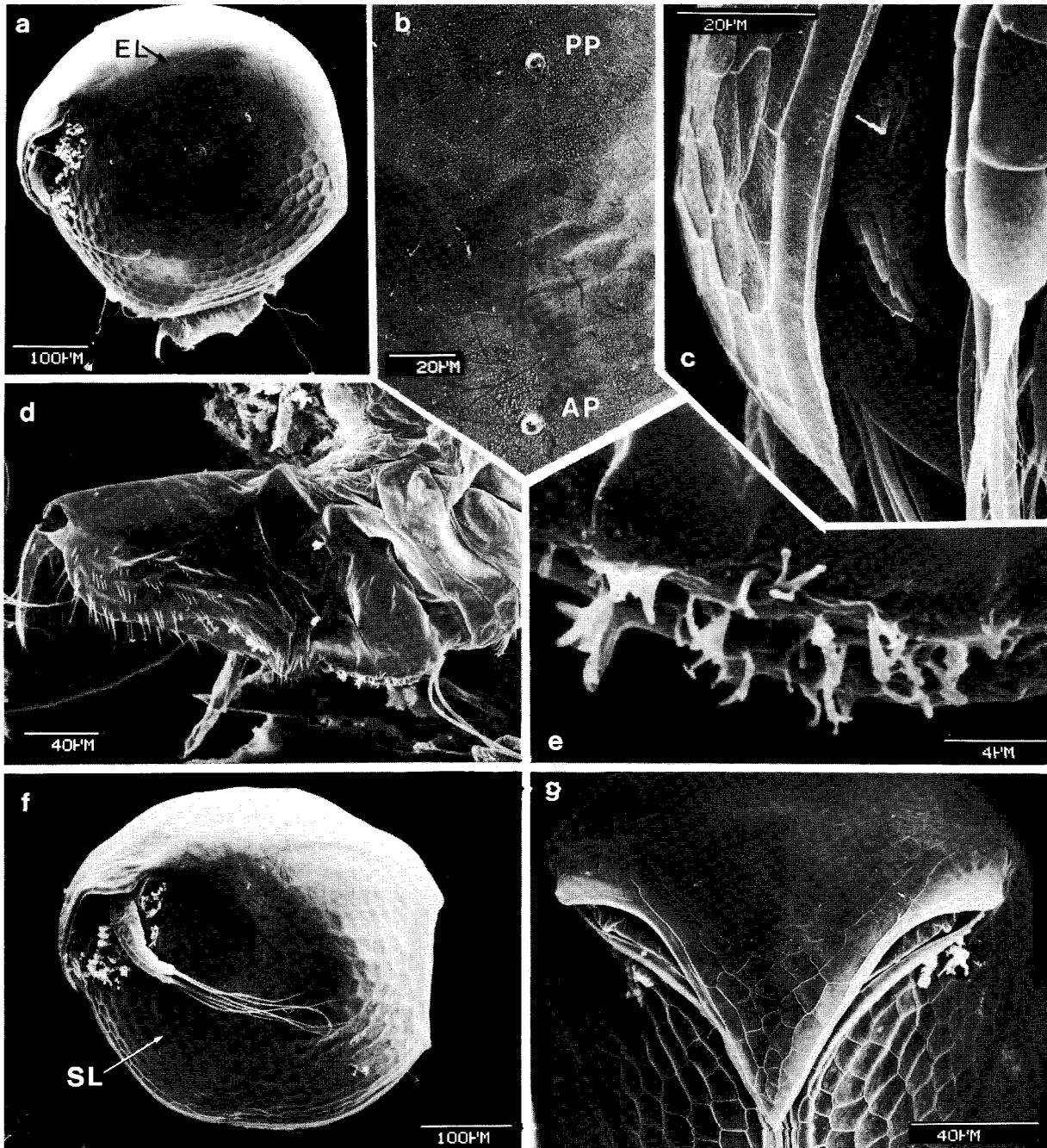


Figure 3.- *Chydorus pizarri* n. sp. from Laguna de Albuera. Parthenogenetic female: a, lateral view; b, head pores (PP, posterior pore; AP, anterior pore); c, lateral view of the rostrum and antennule (AS, antennular seta; AE, aesthetascs); d, postabdomen (The hole at the tip corresponds to the insertion of the left postabdominal claw); e, chitinous excrescences of the preanal margin of the postabdomen; Ephippial female: f, lateral view (SL, slough line); g, frontal view, showing the rostrum and the meshes on shell and head shield.

Chydorus pizarri n. sp. de la laguna de Albuera. Hembra partenogenética: a, vista lateral; b, poros cefálicos (PP, poro posterior; AP, poro anterior); c, vista lateral del rostrum y de la anténula (AS, seda antenular; AE, sedas olfatorias); d, postabdomen (el agujero del extremo corresponde a la inserción de la garra izquierda del postabdomen); e, expansiones quitinosas del margen preanal del postabdomen. Hembra efipial: f, vista lateral (SL, línea de muda); g, vista frontal mostrando el rostrum y la reticulación de las valvas y del yelmo cefálico.

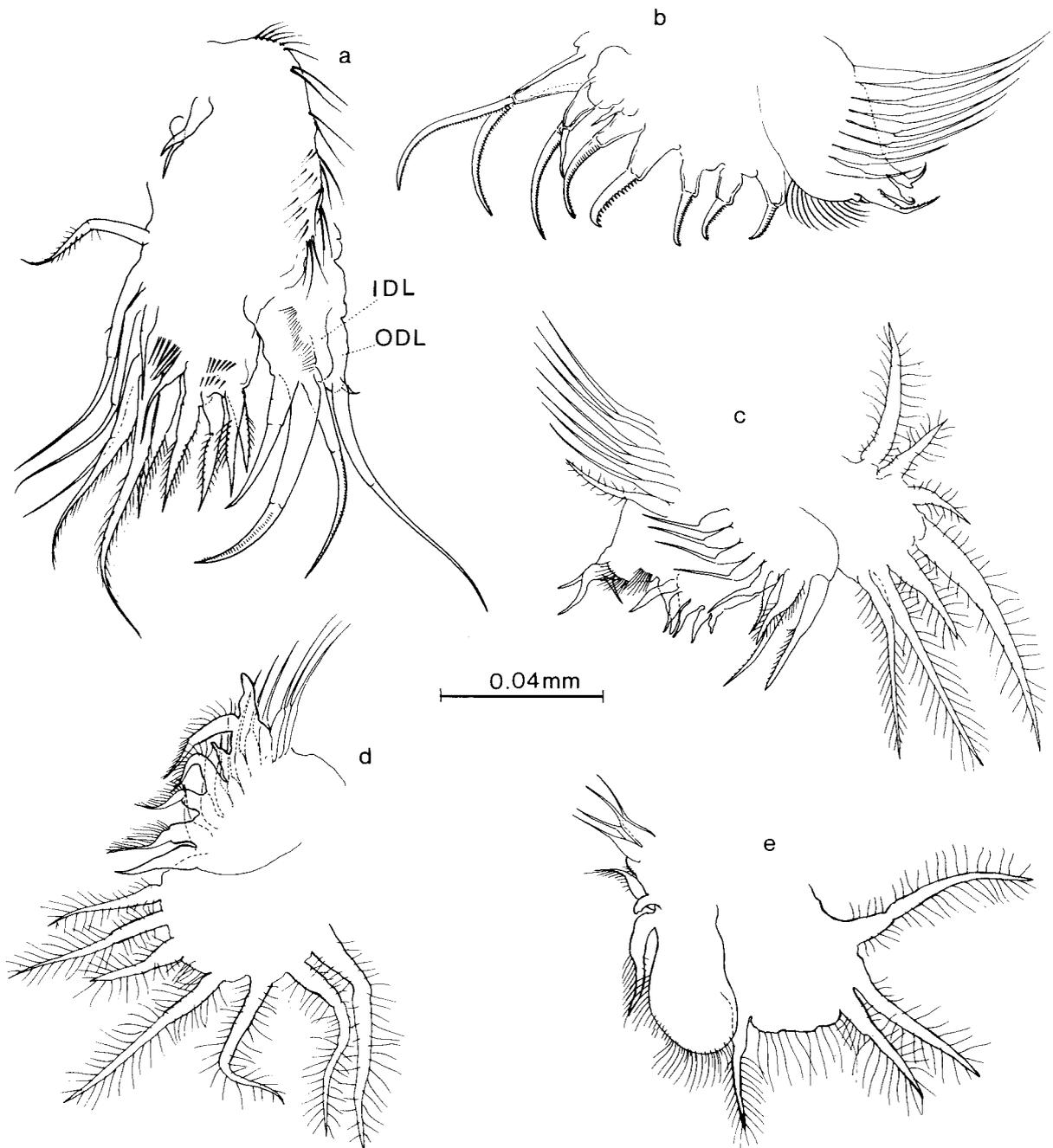


Figure 4.- *Chydorus pizarri* n. sp. from Laguna de Albuera. Parthenogenetic female: a, first thoracic limb (IDL, inner distal lobe; ODL, outer distal lobe); b, second thoracic limb; c, third thoracic limb; d, fourth thoracic limb; e, fifth thoracic limb. *Chydorus pizarri* n. sp. de la laguna de Albuera. Hembra partenogenética: a, primer apéndice torácico (IDL, lóbulo distal interno; ODL, lóbulo distal externo); b, segundo apéndice torácico; c, tercer apéndice torácico; d, cuarto apéndice torácico; e, quinto apéndice torácico.

group around 25. The ventral bulge has only rudiments of setae. The posterior margin of the valves lacks setae or spines.

First thoracic limb (fig. 4a). ODL with two setae and IDL with three setae. The largest of IDL is robust, chitinized, and finely setulate along the distal half.

Second thoracic limb (fig. 4 b). The spine size increases gradually from 1 to 8 (starting from the gnathobase). The fourth spine is more robust and has better defined teeth. The eighth spine has a row of minuscule setae similar to those in spines 5-7.

Third to fifth thoracic limbs (figs. 4c, 4d, 4e). The third thoracic limb has eight gnathobasic setae and seven soft setae; the fourth limb has six gnathobasic setae and seven soft setae; and the fifth has four gnathobasic setae and four soft setae as is usual in the subfamily Chydorinae.

Postabdomen (figs. 1d, 3d). Short, slightly tapered distally. The preanal and anal regions are approximately the same length and almost double the postanal length. The preanal angle is protruding, and the anal outline is distinctly convex. The marginal denticles extend from the preanal angle to the distal section; all are long and are approximately the same length. The anal denticles are distributed in 7-8 groups of two to four denticles; the proximal groups have more denticles, and isolated denticles can also be found; the postanal denticles are generally distributed in three pairs. The lateral surface has two parallel series of small spines, which are more numerous in the proximal groups; ventrally there are fewer groups of spines. The preanal margin has a series of chitinous excrescences. Viewed with an optical microscope they appear as small warts or sticks with blunt ends; however, under higher magnification these structures adopt very different forms like dichotomous expansions or are more or less arborescent, generally with thick ends (fig. 3e).

Postabdominal claw. Approximately 3.5 times shorter than the postabdomen, slightly curved and regularly narrowing towards the tip. There are two spines at the base, the distal one being approximately five times smaller than the total length of the claw, and the proximal one is very small. The concave surface has two groups of setules; the group occupying the distal two thirds

of the claw has larger setules than the group occupying the proximal third. The subapical flagellum is somewhat developed.

Ephippial female (figs. 1e, 1f, 1g, 3f, 3g). The ephippium has only one resting egg. The valves widen and become dark somewhat close to the middle and posterior third. The dorsal margin of the valves have a sharp bend close to the end of the headshield; behind this protuberance there is a straight section, thickened and heavily chitinized, that reaches the posterior-dorsal angle. The slough line is well marked (fig. 3f).

Male:

Dorsal outline is flatter than in the female and there is a strong ventral bulge (figs. 5e, 6a). The rostrum is shorter. Other characters differentiating it from the female are as follows:

Instar II. This instar corresponds to the second immature instar. Rostrum is triangular but shorter than in the females (fig. 5a). The copulatory hook is beginning to develop on the first thoracic appendage and the tip is somewhat sharp, but without stria (fig. 5c). Anlages of the fourth seta of the IDL and copulatory brush setae are well developed (fig. 5c). The postabdomen is similar to that of the female although somewhat shorter (fig. 5d).

Instar III. Is the mature instar. The rostrum is rounded and has a small point at the tip (figs. 5f, 5g, 5h). The antennule (fig. 5j) is broad and has 11 aesthetascs of different length, some of which go beyond the tip of the rostrum. Eight aesthetascs are terminal, and the remaining three are marginal or submarginal. The flagellum (male seta) is pointed, well chitinized, and arises submedially from the outer face. The antennular seta arises from the outer-lateral surface, approximately in the anterior third, and is very thin. The antennal formula is 0-0-3 (1)/ 1-1-3 (1), with the seta of the basal segment of the endopodite more developed than in the female (fig. 5n). It is approximately five times longer than the second segment. The copulatory hook (figs. 5ñ, 5o, 6b) is «U» shaped with the free arm longer. The tip is sharp and has a small groove in the internal face with finely cut sides (fig. 6c). The fourth male seta in the IDL is well developed. The copulatory brush is formed by a cluster of long

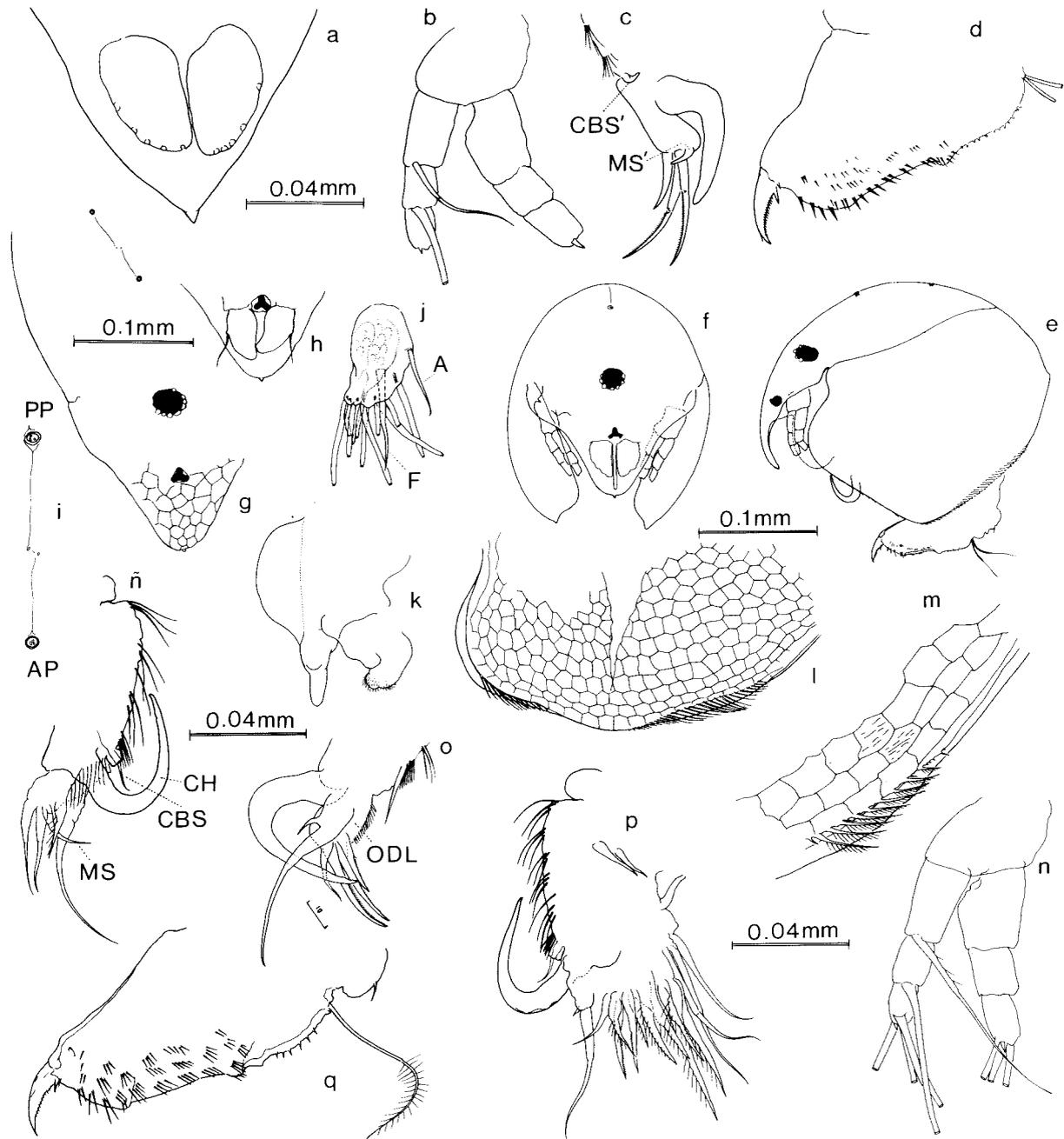


Figure 5.- *Chydorus pizarri* n. sp. from Laguna de Albuera. Male second instar: a, rostrum; b, antenna; c, first thoracic limb (CBS', anlage of the copulatory brush seta; MS', anlage of male seta); d, postabdomen. Mature male: e, lateral view; f, frontal view; g-h, rostrum; i, head pores (PP, posterior pore; AP, anterior pore); j, antennule (A, antennular seta; F, flagellum); k, labrum; l, shell; m, posteroventral margin of the shell; n, antenna; ñ-p, first thoracic limb (ODL, outer distal lobe; IDL, inner distal lobe; CH, copulatory hook; CBS, copulatory brush seta; MS, male seta); q, postabdomen (GP, genital pore).

Chydorus pizarri n. sp. de la laguna de Albuera. Segundo estadio del macho: a, rostro; b, antena; c, primer ápndice torácico (CBS', primordio de la seda del cepillo copulador; MS', primordio de la seda del macho); d, postabdomen. Macho adulto: e, vista lateral; f, vista frontal; g-h, rostro; i, poros cefálicos (PP, poro posterior; AP, poro anterior); j, anténula (A, seda antenular; F, flagelo); k, labro; l, valva; m, margen posteroventral de la valva; n, antena; ñ-p, primer ápndice torácico (ODL, lóbulo distal externo; IDL, lóbulo distal interno; CH, gancho copulador; CBS, seda del cepillo copulador; MS, seda del macho); q, postabdomen (GP, poro genital).

setae. The copulatory brush setae is elongated and articulates on a pear-shaped peduncle (fig. 5ñ). The postabdomen (figs. 5q, 6d) is similar in shape to that of the female except that there is no protruding preanal angle, and the anal groove is longer than the preanal distance. The marginal

denticles are thinner than those of the female but form similar groups. The genital pores open latero-ventrally close to base of claw; the ventral margin bulges because of the thickness of chitin. The terminal claw is shorter and stouter than in the female.

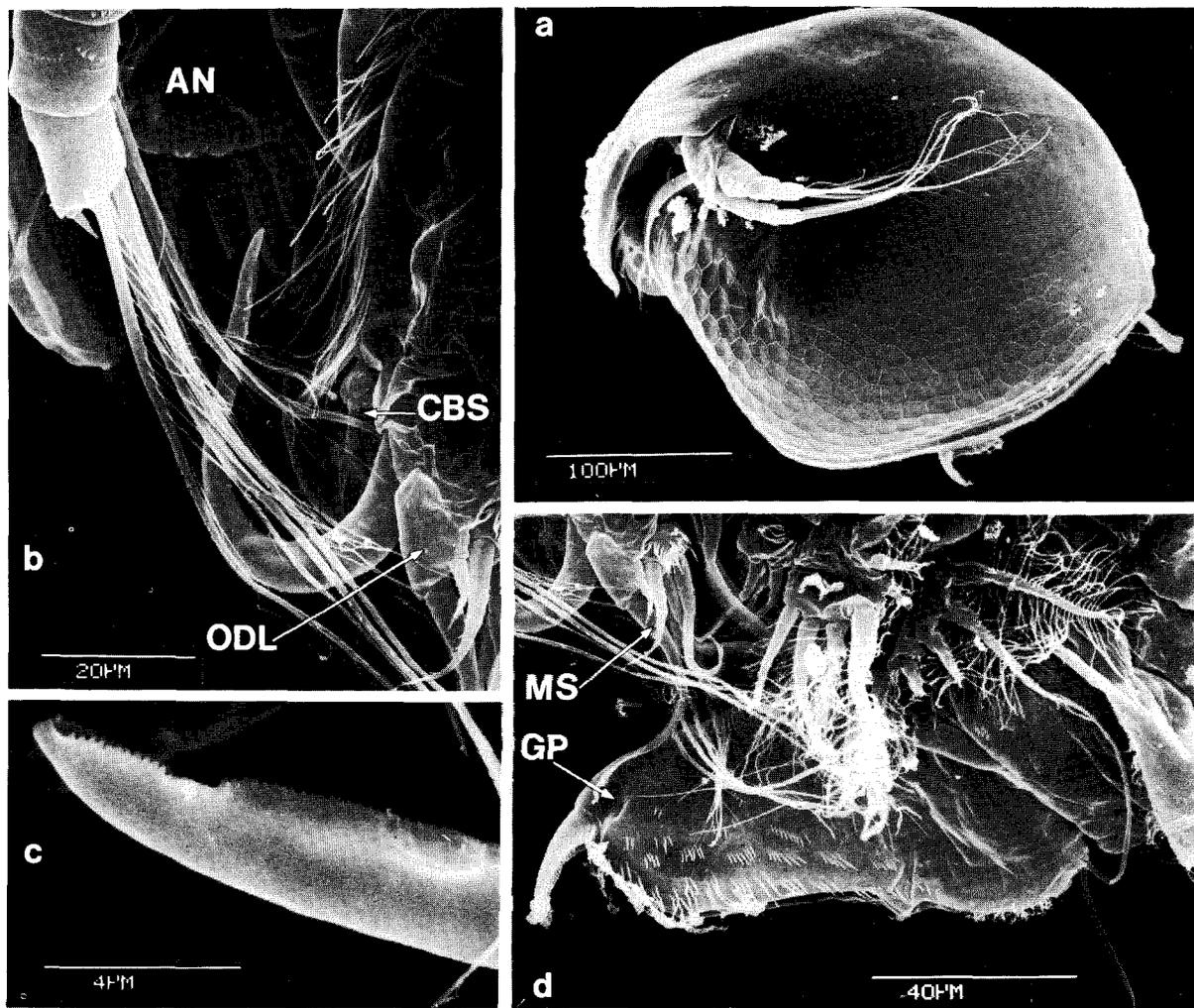


Figure 6.- *Chydorus pizarri* n. sp. from Laguna Grande de Albuera. Male: a, lateral view; b, first thoracic limb (ODL, outer distal lobe; CBS, copulatory brush seta), antennule (An); c, tip of copulatory hook; d, postabdomen (GP, genital pore) and some parts of the thoracic limbs (MS, male seta of the first thoracic limb).

Chydorus pizarri n. sp. de la laguna de Albuera. Macho: a, vista lateral; b, primer apéndice torácico (ODL, lóbulo distal externo; CBS, seda del cepillo copulador), anténula (An); c, extremo del gancho copulador; d, postabdomen (GP, poro genital) y algunas partes de los apéndices torácicos (MS, seda del macho del primer apéndice torácico).

Size (fig. 7). There are small differences between populations. The general range of the Albuera population is 0.28-0.48 mm (37 specimens); females are reproductive after 0.32 mm; ehippial female 0.40-0.42 mm; mature male 0.30 mm. The general range of the Fonfría population is 0.26-0.50 mm (111 specimens); females are reproductive after 0.36 mm.

Geographical distribution and ecology

There are four localities of *C. pizarri* in Spain distributed in the western extreme of the Gua-

diana (Grande de Albuera, La Albuera lagoon, Badajoz), Tajo (Grullo lagoon, Las Ventas de San Julián, Toledo), and Duero (Fonfría lagoon, Fonfría, Zamora; Sedana lagoon, Santa María del Monte Cea, León) watersheds. All are situated between 180 and 900 m a.s.l. All the water bodies are less than 1 m deep and are dry in summer. Turbidity, due to inorganic suspended matter, depends upon the colonization state of the bottom by macrophytes when the substrate is clayish, such as in La Laguna Grande de Albuera, or very reduced in lakes with sandy substrate (Grullo, Fonfría). Mineralization is very low (conductivity, 60 μ S/cm; total alkalinity, 0.28-

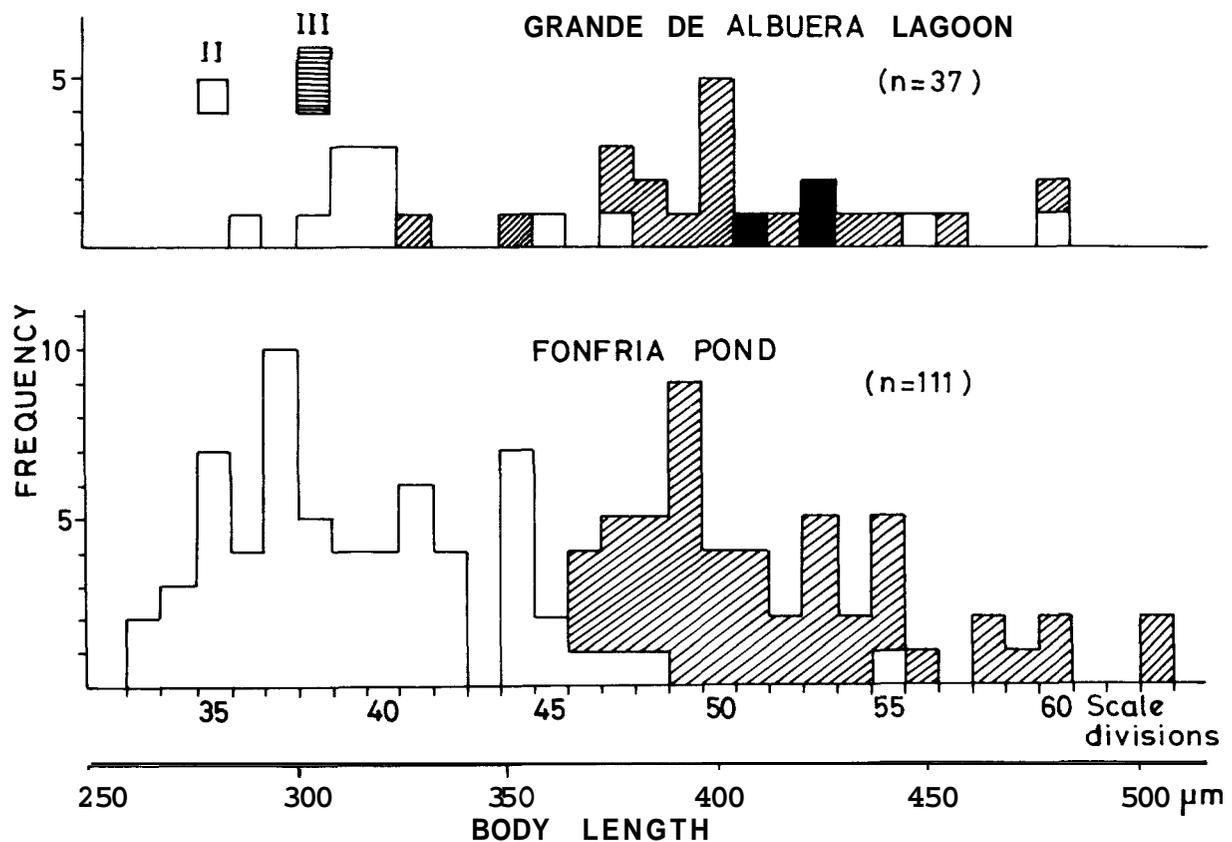


Figure 7.- Length-frequency distributions of the populations from La Albuera lagoon and Fonfría pool. Parthenogenetic females with eggs are indicated by the striped area and ehippial females in black. Males correspond to the frequencies labelled II or III according to the instar represented. n = number of specimens measured.

Distribuciones de frecuencia de tamaños (longitud) de las poblaciones de la laguna de Albuera y la charca de Fonfría. Las hembras partenogenéticas con huevos aparecen indicadas con trama de rayas y hembras ehipiales en negro. Las frecuencias (II-III) corresponden a los respectivos estadios de los machos. n= número de individuos medidos.

2.40 meq/l; Cl^- , 4.49 mg/l; SO_4^{2-} , 5-19 mg/l). Iron concentration can be relatively high (0.7 mg/l in Fonfría). The macrophyte community characteristic of these water bodies is composed of species typical of temporary waters belonging to the genera *Ranunculus*, *Isoetes* and *Marsilea*. Collections were made in March and April; gamogenetic populations are found in April (Grullo and Albuera).

DISCUSSION

The chitinous excrescences on the preanal margin constitute an interesting character in *C. pizarri*, since in the majority of Chydorids this margin is smooth. The only exceptions are the *Eurycercini* in which it is regularly serrate, or *C. bicollaris* Frey 1982 and *C. bicornutus* Doolittle 1909 that have very small wrinkles or crenulations. In *C. pizarri* such structures are normally covered with detritus, which suggests a possible morphological convergence between this species and the macrothricids, which are adapted to benthic life and their preanal margin is always armed with setae or spines.

Other characters relate *C. pizarri* to other species. The protuberance in the dorsal outline recalls the *mutilus* Kreis 1921 variety of *C. sphaericus* (see SMIRNOV 1971) and also the ehippial females (or barren ehippial females) of *C. biovatus* Frey 1985, this last species with the body height considerably increased in order to accommodate the two resting eggs (FREY 1985). This is remarkable given that the ehippium of *C. pizarri* houses only one resting egg. The antennule of the females have lateral aesthetascs like *C. piger* Sars 1862 and *C. ovalis* Kurz 1875 (HANN 1975, SMIRNOV 1971, MARGARITORA 1985). The labrum with the broadly convex ventral keel and finger-like tip has been described in several species of *Chydorus* such as *C. linguilabris* Frey 1982, *C. bicollaris* (see FREY 1982a, FREY 1982b), and in the variety *mutilus*.

The seta of the basal segment of the antennal endopodite is found more frequently in the *Aloninae* than in the *Chydorinae*. It is a secondary sexual character in the males of the *Chydorinae* (FREY 1980), also known in females of the *C.*

ovalis and *C. eurynotus* Sars 1901. This character could be more common but misinterpreted because of its difficulty of observation. For example, PAGGI (1972) was the first to describe this seta in *C. eurynotus*; SMIRNOV (1971) and KOŘÍNEK (1984) make no reference to this seta in *A. karua* King 1853 even though it is present in many Australian and African populations (Alonso unpublished data); SMIRNOV (1971) makes no reference to this seta in *Alona verrucosa* Sars 1901 although it is well described in PAGGI (1975). The postabdomen of the male, very similar to that of the female, relates *C. pizarri* to all those species that do not have a narrow tip such as *C. ovalis*, *C. linguilabris*, *C. bicollaris*, *C. bicornutus* and *C. eurynotus*. The pointed tip of the copulatory hook is not frequent among the species of this genus; it has been described in *C. bicornutus* and in *C. bicollaris*, being its description in the latter species coincident with that of *C. pizarri*.

C. pizarri differs notably from species of the *sphaericus* complex (FREY 1980) by several outstanding differentiating characteristics: 1) the tip of the rostrum is not finely indented but ends in a sharp point; 2) the female antennule has subterminal aesthetascs and the male antennule has 11 aesthetascs instead 12; 3) the seta of the basal segment of the endopodite of the female; 4) the copulatory hook of the first thoracic limb of the male ends in a point, and the copulatory brush seta is longer; 5) the postabdomen of the male is the same type as that of the female.

Of the remaining species in the *Chydorus* genus, *C. pizarri* is closest to *C. ovalis*. In both species the females have similar antennular structure, antennal formula and more or less the same form in the male postabdomen. However, both species can be clearly differentiated through other structures such as the labrum, which is pointed in *ovalis*, and the strong, triangular and more numerous postanal denticles on the postabdomen of the *ovalis* female (comparison with the description of HANN 1975). The postanal marginal denticles of *C. pizarri* are thinner and always form clusters which has already been pointed out as variability in other species such as *C. brevilabris* Frey 1980, and *C. biovatus* (see FREY 1980). The first thoracic limb is also different in *C. pizarri* and *C. ovalis*; in *C. pizarri*, the hook-like

seta of the IDL is strong as in the majority of the *Chydorus*, while this seta in *C. ovalis* is thinner and possibly less efficient in clutching (FRYER 1968). Another important character separating both species is the ventral setation of the shell; the series of setae is not interrupted in *C. ovalis* (see FRYER 1968) so that there is no median seta-free region as in *C. pizarri*.

The distribution of *C. pizarri* is limited to small enclaves with Tertiary sediments affected by arid climate, situated on the Paleozoic Iberic shield having a more benign climate and less soluble materials. This explains the dual character of this species, which shares the autoecology of typically steppic species but which has a distribution similar to species found in a more humid climate. The accompanying species that can help to define the ecological requirements of *C. pizarri* are *Ephemeroporus phintonicus*, *Mixodiaptomus incrassatus*, *Triops cancriformis mauritanicus* and *Cyzicus grubei*. The affinity of these species for somewhat muddy temporary freshwaters has been observed by several authors in the Mediterranean region (GAUTHIER 1928, MARGARITORA 1979, ALONSO 1985). These species have a wide distribution in the Tertiary Iberian basins not shared by *C. pizarri* which is found only in the western section of the Iberian Peninsula. There *C. pizarri* forms part of another group of biogeographically interesting species that contains other recently described endemic chydorids such as *Ephemeroporus epiaphantoi* and *E. margalefi* (ALONSO 1987a) and *Alona*

azorica, the latter which has also been described from the Azores (Frenzel and Alonso in press).

This endemic group is increasing in number and its existence in the western section of the Iberian Peninsula provides additional support for the idea of localism in the cladocerans (FREY 1982c, ALONSO 1987b) and the importance of historical factors in distributions vs. the large capacity of dispersion that these species were thought to possess. Given that cladocerans are very ancient and conservative (FREY 1987), it is reasonable to think that these species have not differentiated by processes of isolation of populations tied to Pleistocene climatic fluctuations, so important in other species, such as for example the diaptomids, but that they represent relict distributions of other more ancient and wider distributions that took place in hotter and more humid climates of the Tertiary period. The Western Iberian Peninsula could be one of the most suitable zones for the maintenance of this fauna due to its marginal location though the Pleistocene glaciation and the present day existence of a diverse and numerous group of water bodies.

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RESUMEN

CHYDORUS PIZARRI SP. NOV., UN NUEVO QUIDÓRIDO (*CLADOCERA*) DEL OCCIDENTE ESPAÑOL

Chydorus pizarri se diferencia del resto de especies de *Chydorus* por poseer una serie de expansiones quitinosas en el margen preanal del postabdomen, no descritas anteriormente en ningún *Chydorinae* o *Aloninae*. Otras características morfológicas importantes de esta especie son, en la hembra: extremo del rostro no dividido, cinco sedas en el endopodito de la antena y una protuberancia acusada en el contorno dorsal del efipio; en el macho: el gancho copulador aparece fuertemente adelgazado distalmente y el aspecto general del postabdomen es similar al de la hembra.

La nueva especie vive en aguas temporales y dulces, y su distribución geográfica se encuentra hasta el momento restringida a las regiones esteparias más occidentales de la península ibérica.

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