

The Bulimulidae from the Región de Atacama, northern Chile (Mollusca: Pulmonata), with the description of five new species of *Bostryx* Troschel, 1847

An interesting MS, covering the (now increased) known species of *Bostryx* from the Atacama Region, part of an, as yet, poorly known terrestrial malacofauna. In keeping with several previous high quality works by the author, this MS is an important contribution, surely useful for a better understanding of the Bostrycinae snails in Chile and South America. This work is also important in that it extends the (admittedly poorly known) geographical distribution of several species, both in a northerly, as well as a southerly direction, thus contributing to the understanding of biogeography (and to an extent ecology) of these land snails. It is my opinion that this paper is worthy of publication.

The MS itself can be improved in various ways, some more important than others. I offer here various comments that I have divided in 2 categories, namely, I- Important things that must be addressed, and II- (less critical, but important) suggestions on stylistic details, or small changes that I believe improve the clarity and readability of the MS.

I - Important things that must be addressed -

1) Mismatch between text, figures and figure legends -

Up to Figure 2, the citations of figures in the text match the figure legends and the shells shown. However, starting with Fig. 3, there is a mismatch which affects the text related to *B. erythrostomus*, *B. huascensis*, *B. ireneae*, *B. ischnus*, *B. mejillonensis*, *B. pumilio*, *B. pupiformis*, *B. pruinus*, *B. pustulosus*, and *B. rhodacme* [the latter, not figured!]. It took some detective work to getting it straight!

2) Figure legends (two items) -

- They don't include an indication of size. I strongly suggest giving the "maximum chord" of every shell figured, in the figure legend, following the mention of the individual specimen. For instance, in Fig. 2 it could say, "G-K: *Bostryx ancavilorum* sp. n., holotype (G, H, H=23.2)", and so on...
- In the text, a full suite of measurements are given for the HT of newly described forms, but this is not true of the individual paratypes chosen for the figures, nor is given for figured specimens of those species that have previously been described. Thus, some shells are shown in figures, for which the reader does not know the size. Including one measurement in the legend has the result that the Figures (with legends) stand on their own with all critical data. Similarly, the museum acronym and catalog number for all shells shown should best be given in the legends. To make

the legends shorter, HT and PT could be used for holotype and paratype, and added to the list of abbreviations used.

- 3) For all taxa that have already been described, the section label "Description" should be followed by "(from Pisbry, 1896)", or "(after Pilsbry, 1896). Currently this is only stated at the end of the description, and in some cases (but not all), the text given is indeed taken straight from the original description. Currently this is somewhat confusing.
- 4) *Bostryx calderensis* (text, lines 20, 193) versus *B. calderaensis* (figure legend, line 793). Being a new name, it would certainly be undesirable to have two alternate spellings. Since the etymology refers to Caldera, probably *calderaensis* should be preferred.
- 5) Observed variation in taxa described as new – Not enough is said about observed variation in size, shape, color, etc. within the type series of the newly described forms. This is critical. For instance, in *Bostryx calderaensis*, the specimen chosen as the HT (fig. 2, Q-R) appears to be much smaller than the PT shown in Fig. 2, S-T (whose size is not given), even though both specimens seem to be adults. This type of variation should certainly be mentioned! - The section of REMARKS (for each taxon) may be the best place to include this type of data.
- 6) Localities (English/Spanish) – The author (and Editors) need to decide on either English or Spanish versions of the various localities: Is it going to be Región de Atacama (title), or Atacama Region (rest of text). Most importantly, I suggest that localities such as "Commune of Caldera" (line 125) are better given as "Comuna de Caldera" (or its correct Chilean name). The latter will most easily lead the user to find the Comuna in a map or gazetteer.
- 7) Key to *Bostryx* species – In Line 61, it is stated that a key to the *Bostryx* from northern Chile (Atacama Region) is given in this work. There is no key in the document I reviewed. A key would certainly be welcome (!!!), but it is not strictly required.
- 8) Several catalog numbers from MZUC & MPCCL are missing.
- 9) Material of *Bostryx inaquosum* (Lines 269-270). This is the only taxon which is dealt with in this MS, but is not figured. As the author stated, the HT is at USNM, and this may be a rare, or possibly endangered species. I encourage every attempt to illustrate this taxon in this MS. The USNM has online images (3 views, see <http://n2t.net/ark:/65665/3c776241b-bef2-48ba-808e-482be8adab44>), which are of sufficient quality to be used as such in this MS. Almost certainly USNM personnel would be able to provide originals of those images, or permission to use the existing ones (Robert Hershler, Curator, or Yolanda Villacampa, Curatorial

Assistant). Figuring this species will result in having all of the known *Bostryx* from Northern Chile figured in this MS, making it more valuable.

II- Suggestions on stylistic details, or small changes, grammar -

Line 14 – Suggest changing, “prolific” to species-rich, diverse, or other. Prolific refers to reproduction, not applicable here.

Line 17 – Suggest changing, “...a formal record of the diversity...”
to “...a formal analysis of the diversity...”

Lines 19-21 – Suggest changing, “... and *Bostryx valdovinosi* sp. nov; while species extend their geographic distribution records.”
Change to, “... and *Bostryx valdovinosi* sp. nov., and the known geographic distribution of seven species is extended.”

Lines 21-22 – Suggest changing, “... Results reveal that the Region of Atacama is the most richest terrestrial snail region in Chile after...”
Change to, “... The Region of Atacama is the richest region in terrestrial snails in Chile, after...”

Line 24 - Suggest changing, “... along the coastal zones and none of them currently protected...”
Change to, “... along the coastal zones, and none of them are currently protected...”

Line 28 – (Keywords). Suggest replacing “new species” (already in title) for “coastal zone”, or something else.

Line 39 – Suggest changing, “... the last major revision on them listed 154 species...”
Change to, “... the last major revision listed 154 species...”

Line 45 - Suggest changing, “... an endemic acavidae species...”
Suggest using “Acavidae”, or “acavid species”

Line 46 - Suggest changing, “... Thomé, 2009) and the description of some new species...”
Change to, “... Thomé, 2009), and the description of a few new species...”

Line 54 - Suggest changing, “... and Araya (2015) reviewing the non-indigenous species...”
Change to, “... and Araya (2015), the latter reviewing the non-indigenous species...”
[otherwise it is not true of the whole list of refs given]

Line 56 - Suggest changing, “... an endemic Southamerican genus which distributes from...”

Change to, "... an endemic South American genus distributed from..."

Line 57 – Suggest changing, "... In Chile this genus is found..."

Change to, "...In Chile, this genus is found..."

Line 63 - Suggest changing, "... which are the most prone to extinction."

Change to, "... which are considered the most prone to extinction."

In addition - Is there a reference to back up this assertion? Otherwise it seems like an opinion, not something demonstrated.

Line 71 – Suggest changing, "...with very scarce precipitations; most of them associated with the El Niño..." Change to,

"...with very scarce precipitation most of which is associated with the El Niño..."

Line 76 – Suggest changing, "...with a similar approach to Cowie & Robinson (2003)"

Change to, "...in a similar manner as those of Cowie & Robinson (2003)"

Line 84 – Suggest changing, "... callipers (+/- 0.1 mm) are depicted in the Figure 1."

Change to "calipers (+/- 0.1 mm) are depicted in Figure 1."

Lines 85-92 (Abbreviations) – Missing several: MCZ; NHMUK; RCG (a personal collection?), potentially add HT (holotype) and PT (paratype(s)), to shorten figure legends and accommodate measurements and museum acronyms/catalog numbers.

Line 92 – "WA, width of aperture". Most likely including lip, which should be stated.

Line 129-131 – Suggest changing, "... This species has shiny white shells with a conspicuous roseate-red apex..." Change to,

"The conspicuous roseate-red apex is more notable in juvenile snails, as the pink hue fades quickly (Fig. 2E). This is one of the most abundant land snail species in the Region of Atacama, but it is restricted to..."

Line 141(Diagnosis), and Line 143 (Description) of *B. ancavilorum* –

141- "... elongate white shell..." – Not elongate for a *Bostryx*! (for instance, see *ischnus*, *pumilio*, *valdovinosi*, and many others.)

143- "... stout, ovate elongate,..." This is in partial contradiction.

Also, notice that in Line 151 it is stated that "This species is similar to *B. albicans*...", but *albicans* is described as obese elongate (Line 117). Consistency is needed.

Line 144 – "Colour white," Why British spelling? The rest of the text does not use it.

Line 150 – "Animal unknown". I suggest changing the word ANIMAL to SOFT PARTS, or BODY. After all, the shell is part of the animal. This also applies to other species (*breurei*, *ireneae*).

Line 155 – “*B. albus*” – First (and only) time mentioned in text. Authority and date must be given (Sowerby, 1833?).

Line 169 - Suggest changing, “... by a slender, elongate-ovate fragile...”
Change to, “...by an elongate-ovate fragile...” – *B. breurei* is NOT slender in the sense of other slender *Bostryx* (i.e., *ischnus*, *pumilio*, *valdovinosi*, etc., from those shown in this MS).

Lines 161-191 – *B. breurei*, sp. nov. A rose tint in the overall shell color of the HT is not mentioned. *B. breurei* is described from only 2 specimens, the HT, and a worn PT. Since the HT is the bearer of the name, the coloration must be mentioned, even if the extent of color variation in this taxon is not known.

Line 174 – About the spiral lines of *B. breurei*. First, this is a place where figure 2N should be cited (otherwise it is shown but isn't really used!), even though honestly I can't see the spiral lines. On the other hand, it appears that either the spiral lines are restricted to the subsutural area (mentioned but not evident in the picture), or they are less dense than the axial elements, which is not mentioned but should.

Line 187 – Suggest changing, “... only two complete specimens were recovered...”
Change to, “... only two, somewhat worn complete specimens were recovered...”

Line 200 and 2003 – Change “...by a obesely ovate white...”
to “...by a somewhat obese-ovate white...” [or some other descriptor → Obesely is not accepted by most dictionaries]

Line 208 – Change “... straight or lightly concave;” to “... straight or slightly concave;”

Line 209 - Suggest changing, “Umbilicus large and deep”
Change to “Umbilicus large, broad and deep”

Lines 212, 218, 220 and elsewhere throughout the text – Change “*erythrostroma*” and “*erythrostroma* (Sowerby)” to *erythrostromus*, unless referring specifically to the original description or the type material, in which case Sowerby should NOT be in parenthesis.

Line 213 – Suggest changing, “... , the much more convex whorls...” [of *erythrostromus* versus *calderaensis*]. The problem is that *B. erythrostromus* is variably in whorl convexity: For instance, the two specimens of *B. erythrostromus* shown Figs. 3 D-E, and 3 G-H are quite different in whorl convexity. *B. calderaensis* (Figs, 2 Q-T) is intermediate between those two extremes. I am not sure what the author would prefer, but it is not the case that *erythrostromus* is always much more convex. Perhaps, something like “generally more convex whorls”, if indeed most specimens are more convex?

Lines 210-215 – Remarks under *B. calderaensis*.

It may be worthwhile comparing *calderaensis* with *huascensis* (Fig. 3 I-J) whose shape (outline), size and umbilicus, and even color, are fairly similar to those of *calderaensis*.

[Figure 3] A-C: *Bostryx catalani*, sp. nov., holotype (Line 795). This is the place where the description of *B. catalani* may go in the text (following the chosen alphabetic order), but it isn't. Currently, *B. catalani* appears only in the figures.

Line 219 – *Bostryx erythrostomus* (Figs. 3 A-E). Should be 3 D-H

Line 223, and throughout the text – Change “Jansen” to “Janssen”

Line 233 - Suggest changing, “... , the edge light.” to “... , the edge light in color.”

Line 240 - Suggest changing, “... large white shells...”. The base color seems very variable, even though some are externally white (Fig. 3 D-E). Specimen in Figs. G-H should NOT be referred to as white.

Lines 245-246 – *Bostryx huascensis* (Figs 3F-G). Should be 3 I-J.

Lines 262-263 - Suggest changing, “...a smaller (up to 19.5 mm), and stouter shell with a more acute spire.” Change to, “...a smaller (up to 19.5 mm), stouter shell with a more acute spire, and the larger umbilicus.”

Lines 261-263 – Remarks. As stated above, this species should probably be compared to *B. calderaensis*, with which it bears similarity.

Lines 266-268 – *philipii* should be *philippii*.

Line 266-267 – Breure's reference for *Bostryx inaquosum* should read “Breure, 1978: 92, pl. 10. Fig. 13.” That is the first figuring of this taxon.

Lines 282-283 - Suggest changing, “... city of Copiapó yield no specimens of this taxa.” Change to “... city of Copiapó yielded no specimens of this taxon.”

Line 287 – *Bostryx ireneae* (Figs. 3H-K). Should read Figs. 3K-N.

Lines 292-294 – I suggest changing the order of the statements, so that morphology is given before coloration. Color is often not observable (or not well) in less than fresh material.

Line 298 – Regarding the statement, “Protoconch smooth and pointy, comparatively small...”. Three separate issues: 1) The protoconch is not pointy; the apex is pointy. 2) The protoconch is NOT small (fig. 3N); in fact, it is relatively large, as compared to the protoconchs of *B. albicans* (fig. 2D), or *B. mejillonensis* (fig. 3S). 3) I suggest finding a better term than “pointy” for the apex, as pointy is a non-technical term (perhaps acute?).

Lines 303-308 – I suggest comparing *B. ireneae* to *B. breurei*. Both have similar outlines, although *B. breurei* is smaller [the color difference is not useful unless relatively fresh material is available, which often is not the case].

Line 307 – “...a much large last whorl...and receding columella and in having...”
Change to, “...a much larger last whorl...and receding columella, and in having...”

Lines 311-312 – *Bostryx ischnus* (Figs. 3 L-M). Should read Figs. 3 O-P.

Lines 318 and 332 – Pilsbry’s 1896 description states “large umbilical area”, and the Remarks state “small umbilical area”. It is unclear what Pilsbry meant, but the Remarks should address AND CLARIFY the issue, currently in contradiction.

Lines 329-330 – Suggest changing, “The species examined here fill the gap on its distribution.”

Change to, “The specimens reported upon here fill the apparent distributional gap between those localities.” (or something like that)

Lines 335-336 – *Bostryx mejillonensis* (Figs. 3N-P). Should read (Figs. 3 Q-S)

Lines 342 and 344 – “punta Frödden” should read “Punta Frödden”.
“umibilicate” should read “umbilicate”

Lines 355-356 – *Bostryx pumilio* (Figs. 3Q-R) should read (Figs. 3T-U).

Line 367 – “RMNH.MOL 329667 (lot).” Unsure what “(lot)” means, but it seems unnecessary. Perhaps is meant to indicate multiple specimens? Still, probably not needed.

Line 373 – “...and they lack visible sculpture.” This is in contrast with Pilsbry’s description, and is also in contrast from what can be seen in the 4th-6th whorls in Figs. 3T-U. The statement should be re-worded.

Lines 376-377 – *Bostryx pupiformis* (Figs. 3S-U). Should read (Figs. 4A-C).

Lines 399 (and 392, and 365). El Morro Hill is here used as Hill, and as hill. If the word “hill” is part of the name, then it should be capitalized; otherwise it should not, but consistency is desirable.

In any event, “...the El Morro Hill;” (line 399) is unnecessarily redundant.

Lines 423-424 – *Bostryx pustulosus* (Figs. 4D-F) should read (Figs. 4G-I).

Lines 445-446 – Suggest changing, “...This characteristic set this species...”

Change to, “...The latter characteristic sets this species...”

Lines 448-449 – *Bostryx rhodacme* (Figs. 4G-I). As far as I can tell, this species is not figured in Fig. 4, nor anywhere else. It should.

Line 488 – "...large umbilicus (Fig. 4O)..."
Should read, "...large umbilicus (Fig. 4L)..."

Line 511 – Suggest changing "bigger" to "larger".

Lines 521-525 – RE Listing of subgenera of *Bostryx*, with representative species. I would recommend to list *Bostryx* s.s. first, and then the rest chronologically.

Line 531 – Suggest changing, "...has been recently the subject of..."
to "...has recently been the subject of..." , and "...with their invertebrate fauna,..."
to "...with *its* invertebrate fauna,..."

Lines 534-535 – Suggest changing, "Most of the taxa found in this study were also recorded in limited and often specific distributions along the coastal desert.", to
"Most of the taxa discussed in this study were also recorded in often narrow distributions,
or single localities along the coastal desert."

Lines 535-536 – Suggest changing, "This endemism is alike to that of similar bulimid species..." to "This endemism is alike to that of other bulimulid species..."

Line 539 – Suggest changing, "that the same behavior affect the..." to
"...that the same circumstances affect the..."

Line 542 – Statement "...including the only living snails, found in humid years." This should be followed by a reference, even if it is simply (Araya, unpublished observations, and perhaps a date). After all, this is a result of the surveys the author carried out.

Line 542 – Suggest changing, "It was noted also..." to "It was also noticed..."

Line 544 – Suggest changing, "...; this can be explained as *Bostryx* species have..."
Change to, "...; this is consistent with the observation that *Bostryx* species have..."

Line 551 – Suggest changing, "... 17 species herein studied."
Change to "... 17 species studied herein."

Line 554 – Suggest changing, "In summary, the Bulimulidae family encompasses 17 species..." Change to, "In summary, the family Bulimulidae includes 17 known species..."

Line 556 – Suggest changing, "...existence of several undiscovered species..." to
"...existence of several previously undiscovered species..."

Lines 560-561 – Suggest changing, "I propose that many be considered for candidates of threatened species status,..." Change to,
"I propose that several be considered as candidates for threatened species status,..."