

## Presence of the genus *Pelopina* Huber, 2010 (Mollusca: Bivalvia: Thraciidae) in the Arabian Gulf

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**Abstract.** Shells of a lithophilous, nestling, distorted Thraciidae collected in the Arabian Gulf are described and compared with similar known species from the Indo-Pacific. The structure of the chondrophore and lithodesma give affinity with *Pelopina brevifrons* (H. Adams, 1868) and *Thracia rudis* Reeve, 1959 but unlike that of *Thracia cuneolus* Reeve, 1859. The latter two species are known only from their unique holotypes and are redescribed here. Insufficient specimens preclude the precise identification of the Arabian Gulf shells, except that they can be allocated to the genus *Pelopina* M. Huber, 2010. *Pelopina* and *Ixartia* Leach, 1852 are compared and are kept as distinct genera within the Thraciidae.

**Key words.** Taxonomy, re-descriptions, Kuwait, Saudi Arabia, Anomalodesmata, lithophilous

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### INTRODUCTION

Oliver *et al.* (2023) illustrated a species of Thraciidae from Kuwait as "*Ixartia* sp." due to its general similarity with the European *Thracia (Ixartia) distorta* (Montagu, 1803). As so few valves were collected in Kuwait, no further investigation was made but now another complete shell has been found in the Arabian Gulf, off Dhahran, Saudi Arabia. This fostered renewed research and led to a wider-ranging investigation of lithophilous thraciid species in the Indo-Pacific that nestle among rocks, in crevices, or in abandoned burrows. Coan (1990) discussed the genus *Ixartia* Leach, 1852 as the only genus of nestling species and listed the following species under *Ixartia* as a subgenus, giving *Pelopina* H. Adams, 1868 as a synonym:

Indo-Pacific

- *Thracia (Ixartia) rudis* Reeve, 1859
- *Thracia (?Ixartia) brevifrons* (H. Adams, 1868)
- *Thracia (Ixartia) cuneolus* Reeve, 1859

Eastern Pacific

- *Thracia (Ixartia) curta* Conrad, 1837
- *Thracia (Ixartia) anconensis* Olsson, 1961

Atlantic/Caribbean

- *Thracia (Ixartia) distorta* (Montagu, 1803)

- *Thracia (Ixartia) morrisoni* Petit, 1964
- *Thracia (Ixartia) similis* Couthouy, 1839

On *Pelopina*, Coan (1990: 33) wrote:

However, it was described as having a large lithodesma, suggesting it does not belong here. Its type specimen should be re-examined, and a replacement name provided if it proves to be a useful generic unit.

Ten years later Huber (2010) replaced the junior homonym *Pelopina* with *Pelopina* Huber, 2010 but described the hinge as having "two adjacent, but separated solid, vertical chondrophore-like teeth" (p. 785). He noted that *Thracia rudis* was similar to *Pelopina brevifrons* but that both were known only from their unique holotypes. To find a possible identification for our Arabian shells we examined the type material of the three Indo-Pacific *Ixartia* species listed by Coan (1990).

### MATERIALS AND METHODS

The Arabian materials collected by the authors are listed below, and the comparative material consisting of unique holotypes and syntypes came from the collections of the Natural History Museum, London and the Royal Albert

Memorial Museum, Exeter. Abbreviations associated with the materials are ARC-EMS, KFUPM, Applied Research Center for Environment and Marine Studies, Research and Innovation, King Fahd University of Petroleum & Minerals (Dhahran, Saudi Arabia); NMW. Z., National Museum of Wales, Zoology (Cardiff, Wales); NHMUK, The Natural History Museum (London, England); RAMM, The Royal Albert Memorial Museum (Exeter, England).

The shells were photographed with a Leica Z6 APO microscope and focus-stacked using HeliconFocus. The scanning electron micrographs were made using a Jeol JSM600 benchtop microscope under low vacuum and without coating.

## TAXONOMY

### *Pelopina brevifrons* (H. Adams, 1868)

Figure 1

*Pelopina brevifrons* H. Adams 1868: 17, pl. 4 figs 16, 16a.

*Thracia* (? *Ixartia*) *brevifrons* (H. Adams, 1868)—Coan 1990: 33.

*Pelopina brevifrons* (H. Adams, 1868)—Huber 2010: 785, Excel listing.

**Material examined.** Known only from the holotype, NHM UK 1878.1.28.108, a complete shell.

**Type locality.** Unknown. It is not possible to suggest a type locality, as H. Adams described species from numerous parts of the world (Trew 1992).

**Description.** Shell 15.7 mm long, 13.4 mm high, strongly inequilateral; beaks toward anterior. Outline subovate, anterior broadly rounded, tapered to narrowly rounded posterior. Commarginal sculpture irregularly and finely rugose, coarsely granular particularly near margins. Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores deeply projecting, anterior edge almost straight; lithodesma proportionately large (Fig. 1H, I) creating a deep anterior gap in hinge plate once lost (Fig. 1G); ligament mainly internal.

### *Pelopina rudis* (Reeve, 1859)

Figure 2

*Thracia* (*Rupicola*) *rudis* Reeve, 1859: *Thracia* pl. 3 fig. 21.

*Thracia* (*Ixartia*) *rudis*, Reeve, 1859—Coan 1990: 33.

*Pelopina rudis* (Reeve, 1859)—Huber 2010: 785, Excel listing.

**Material examined.** Known only from the holotype, NHMUK 20240232, a complete shell.

**Type locality.** Malacca, now Melaka, Malaysia.

**Description.** Shell 29.4 mm long, 21.3 mm high, inequilateral; beaks toward anterior. Outline irregularly oval;

anterior broadly rounded, posterior less so. Commarginal sculpture finely rugose, coarsely granular particularly near margins (Fig. 2E). Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores deeply projecting, anterior edge almost straight; lithodesma proportionately large, filling a deep anterior gap (Fig. 2F, G); ligament mainly internal.

### *Ixartia cuneolus* (Reeve, 1859)

Figure 3

*Thracia cuneolus* Reeve, 1859: *Thracia* pl. 1 fig. 2.

*Thracia* (*Ixartia*) *cuneolus* Reeve, 1859—Coan 1990: 33.

*Thracia* (*Ixartia*) *cuneolus* Reeve, 1859—Huber 2010: Excel listing.

**Material examined.** 4 syntypes, NHMUK 20240231, all paired valves.

**Type locality.** Not indicated by Reeve (1859) and not on original labels. Higo *et al.* (1999) cited the Philippines as the type locality and gave a range from the east China Sea, Japan, and the Philippines.

**Description.** Shell most like that figured by Reeve (1859) is 18.1 mm long × 12.8 mm high; shells range from 14.7 mm to 18.1 mm long. All are inequilateral; beaks toward anterior; outline irregularly subovate; anterior narrowly rounded, posterior broadly rounded or flared, with a weak posterior to ventral rounded angle. Commarginal sculpture finely rugose, coarsely granular particularly near margins (Fig. 3F, G). Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores deeply projecting, obliquely rounded (Fig. 3H, I); lithodesma small, not creating a large anterior gap (Fig. 3I); ligament mainly internal.

### *Pelopina* sp. from Arabian Gulf

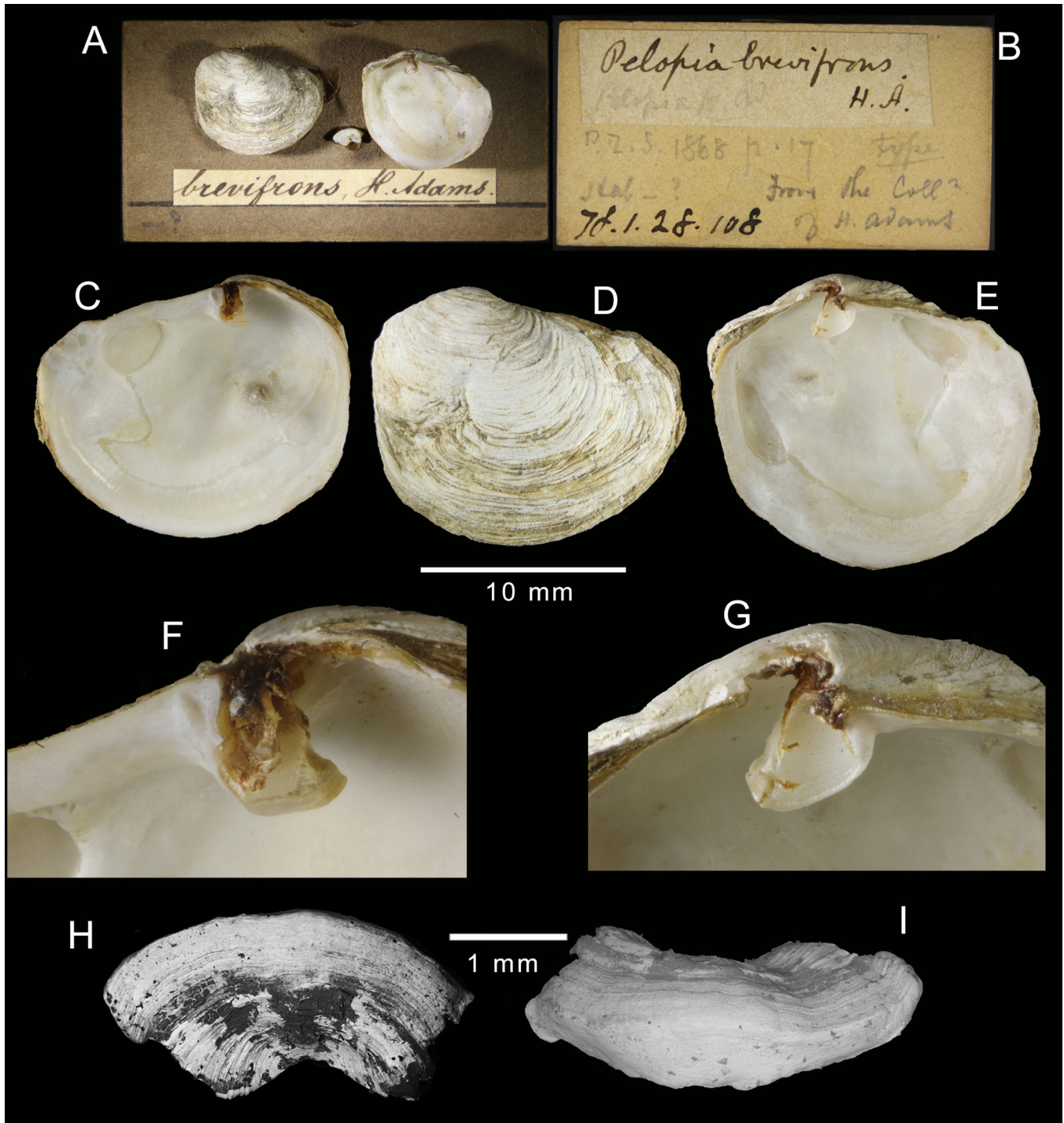
Figure 4

*Ixartia* sp.—Oliver *et al.* 2023: 20, pl. 8 fig. 72.

**Material examined.** Kuwait, Ras Al Zour, strandline, 28° 44.517'N 048°22.950'E, coll. H. Dekker & P.G. Oliver, Nov. 2018, NMW.Z. 2021.009.24 (3 valves: 2 left + 1 right).

Saudi Arabia, Al Khobar, 26°18'00.0"N 050°13'39.2"E, 3 m depth, nestling in calcareous rock along with Gastrochaenidae, Lithophaginae, and Petricolidae; in old museum collection of ARC-EMS, KFUPM (1 complete shell)

**Description.** Largest shell 16.9 mm long × 13.2 mm high (Fig. 4A); Dhahran shell 10.1 mm long × 8.4 mm high (Fig. 4C, D). All shells inequilateral; beaks slightly or distinctly toward anterior; outline irregularly subovate; anterior narrowly rounded to broadly rounded, posterior broadly rounded. Commarginal sculpture coarsely rugose especially at margins and on posterior area; coarsely granular partic-



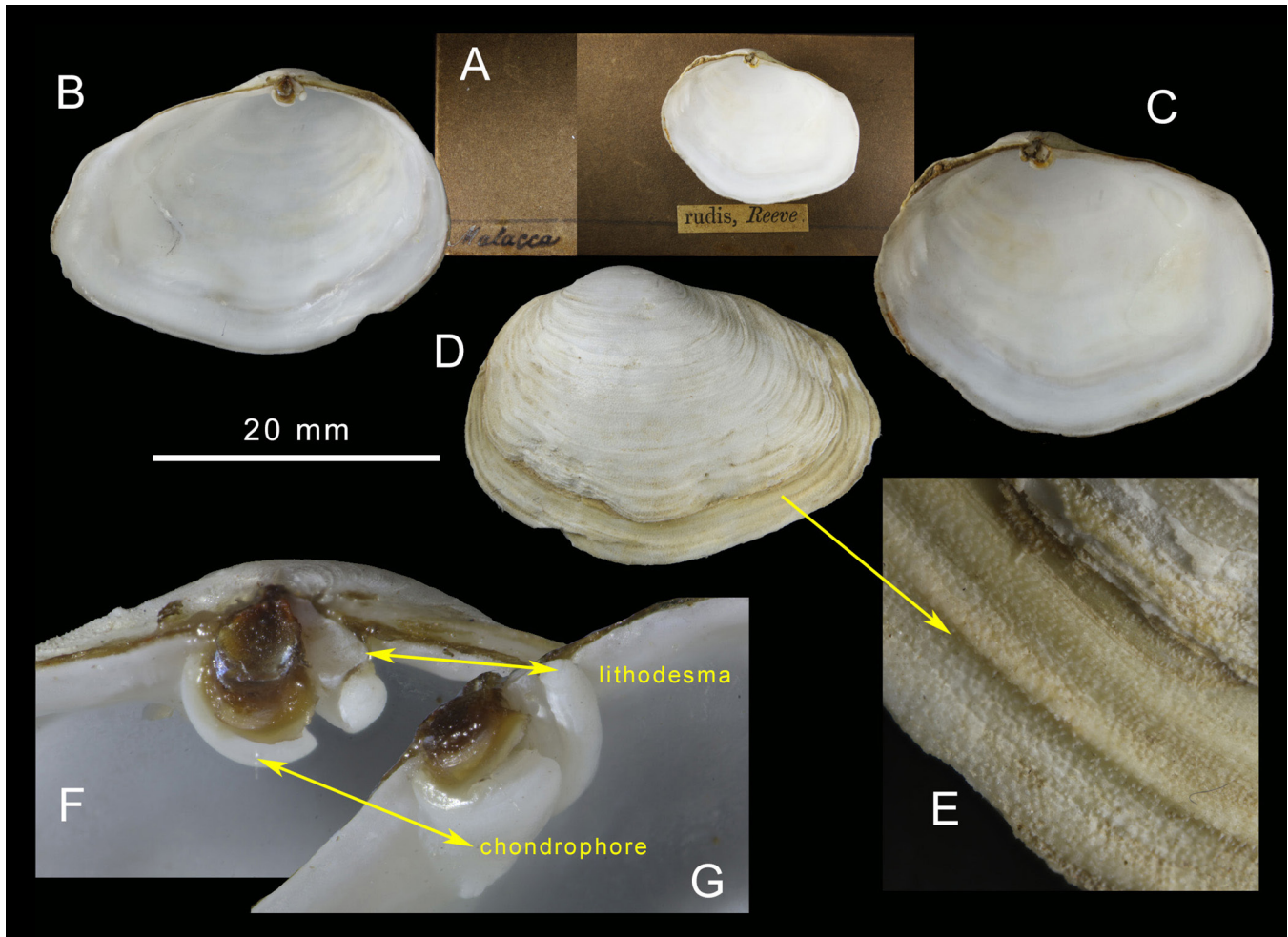
**Figure 1.** *Pelopina brevifrons* (H. Adams, 1868). Holotype of *Pelopina brevifrons*, NHMUK 78.1.28.108. **A, B**, museum mount with data on reverse. **C, E**, internal views of left and right valves. **D**, external view of left valve. **F, G**, chondrophores of right and left valves, respectively. **H, I**, scanning electron micrographs of lithodesma.

ularly near margins (Fig. 4E). Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores deeply projecting (Fig. 4B, F, G), anterior edge straight; lithodesma large, creating a large anterior gap (Fig. 4G); ligament mainly internal.

#### Comparisons

Comparisons of the Arabian Gulf shells with the three nestling species known from the Indo-Pacific reveals a closest affinity with *Pelopina brevifrons* and *P. rudis* in sharing the





**Figure 2.** *Pelopina rudis* (Reeve, 1859). Holotype of *Thracia rudis*, NHMUK 20240232. **A**, museum mount with data on both sides. **B**, **C**, internal views of left and right valves. **D**, external view of left valve. **E**, coarsely granular surface. **F**, **G**, two views of the chondrophore with lithodesma in situ.

shape of the chondrophore and an associated large lithodesma. *Thracia cuneolus* has a very small lithodesma and in outline is very similar to the European *T. (Ixartia) distorta*. All nestling species have variable shells and, given the rarity of both *P. brevifrons* and *P. rudis*, it is not possible to ally the Gulf shells with either taxon or to differentiate the Gulf shells as a distinct species. Only with much larger samples will it be possible to assess distinctions in morphology that are taxonomically significant. However, the Arabian Gulf records are the first for the genus *Pelopina* since its original description, as *Pelopina*, in the nineteenth century.

#### Genera of nestling Thraciidae

Both Coan (1990) and Huber (2010) discussed the value of the genus *Pelopina*, although Coan was uncertain because he had not seen *Pelopina brevifrons*. Huber (2010) surmised that *Pelopina* may not belong to the Thraciidae, but our fig-

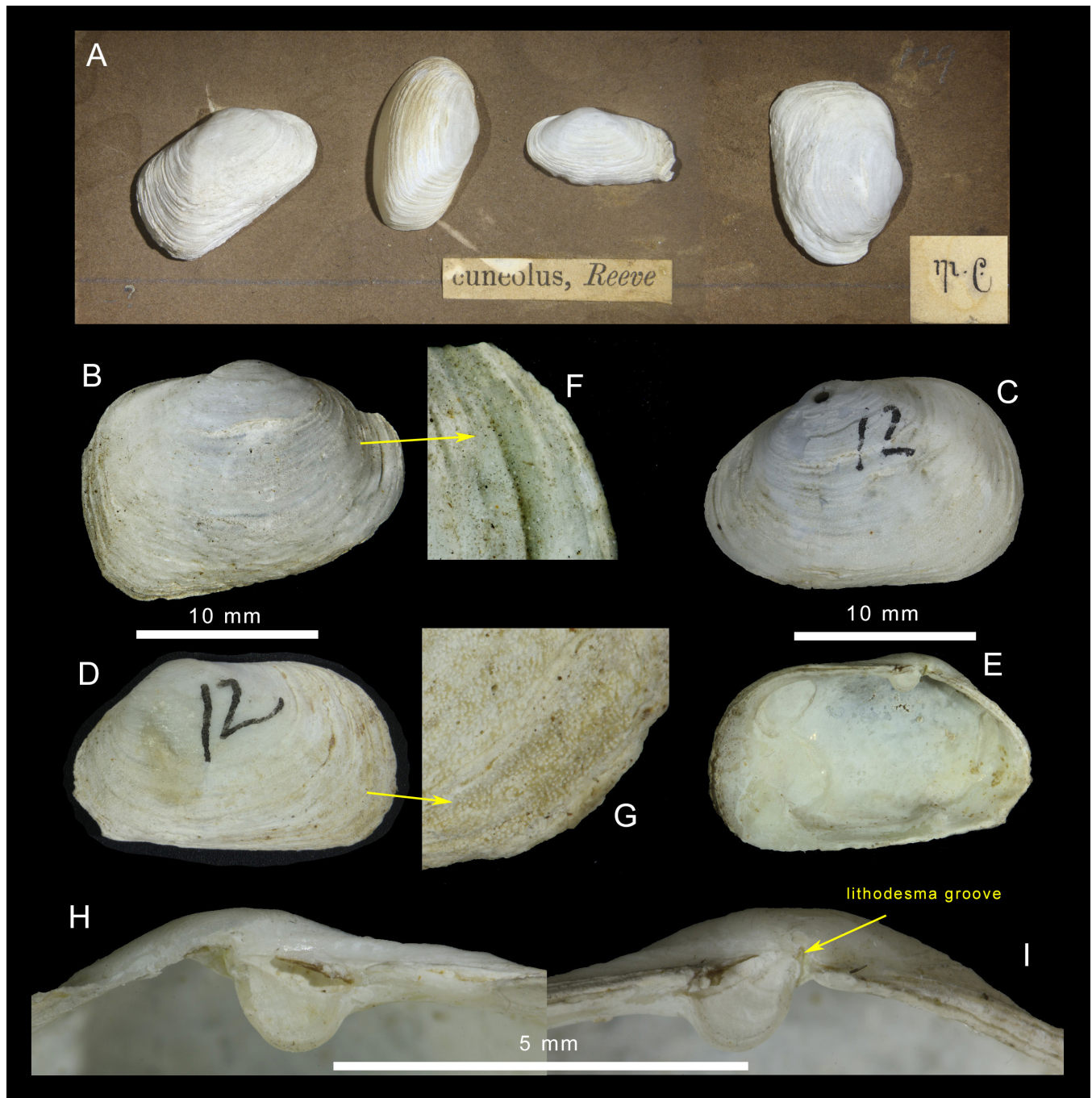
ures of *Pelopina* illustrate that it has all the characters of a thraciid but that the lithodesma is exceptionally large. Nestling species have been distinguished as belonging to the genus *Ixartia* by Kamenev (2002) and Oliver et al. (2023) and has been used as subgenus of *Thracia* by Coan (1990) and Huber (2010). MolluscaBase (2024) lists *Ixartia* and *Pelopina* as separate genera, and we give differential diagnoses for these taxa here.

#### Genus *Ixartia* Leach 1852

Figure 5

**Type species.** *Mya distorta* Montagu, 1803 (5 syntypes in RAMM Exeter, EXEMS Moll3693-4, see Oliver et al., 2017).

**Other species included.** *Ixartia cuneolus* (Reeve, 1859), *I. curta* (Conrad, 1837), *I. morrisoni* (Petit, 1964), *I. similis* (Couthouy, 1839).

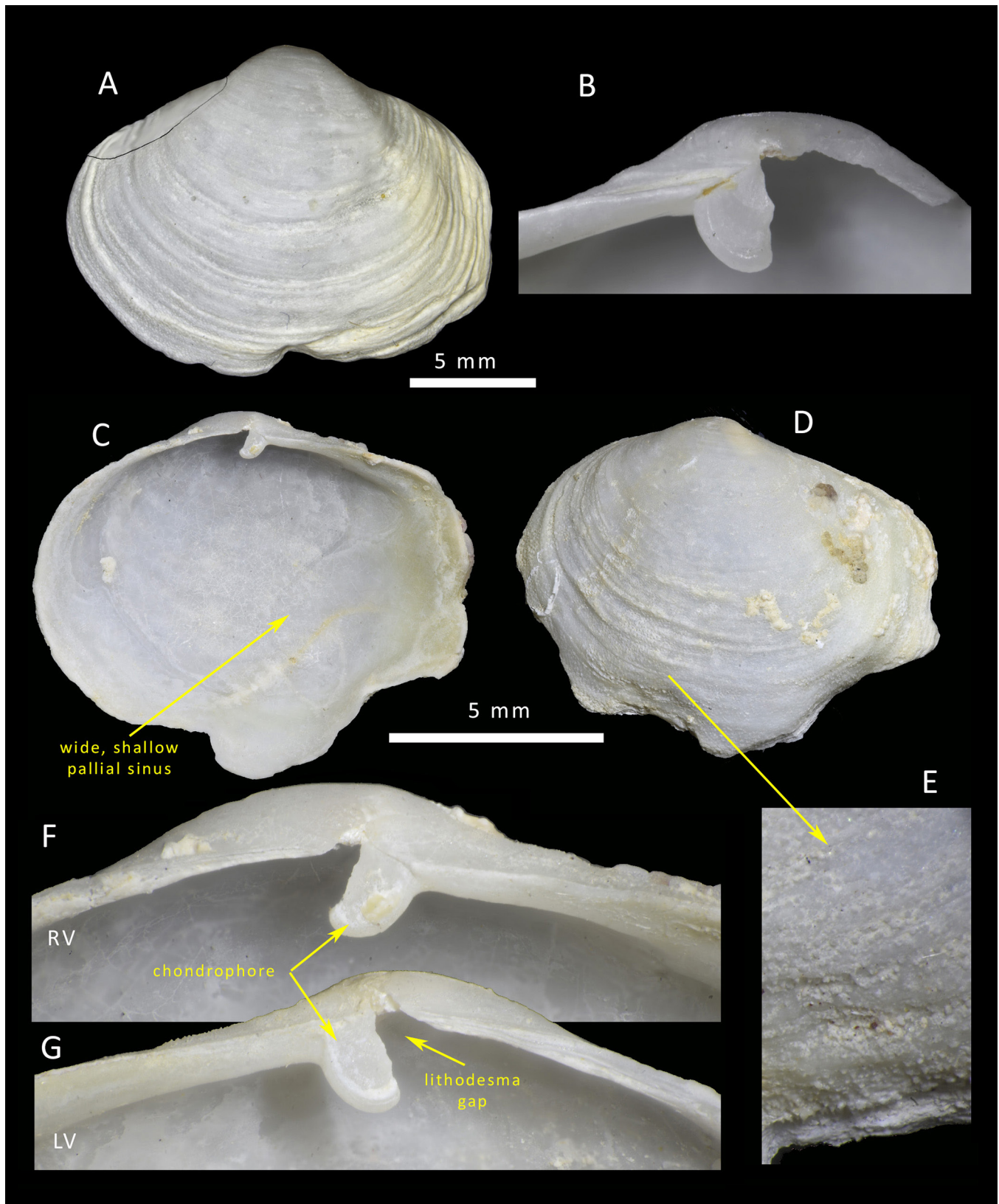


**Figure 3.** Syntypes of *Thracia cuneolus*, NHMUK 20240231. **A**, museum mount with only 4 of 8 valves photographed; “MC” abbreviation for Museum Cuming is on reverse. **B, C**, left and right valves of shell most similar to figure in Reeve (1859). **D, E**, external and internal of left valve second syntype. **F, G**, anterior and posterior surface granulation. **H, I**, right and left chondrophores of **D**.

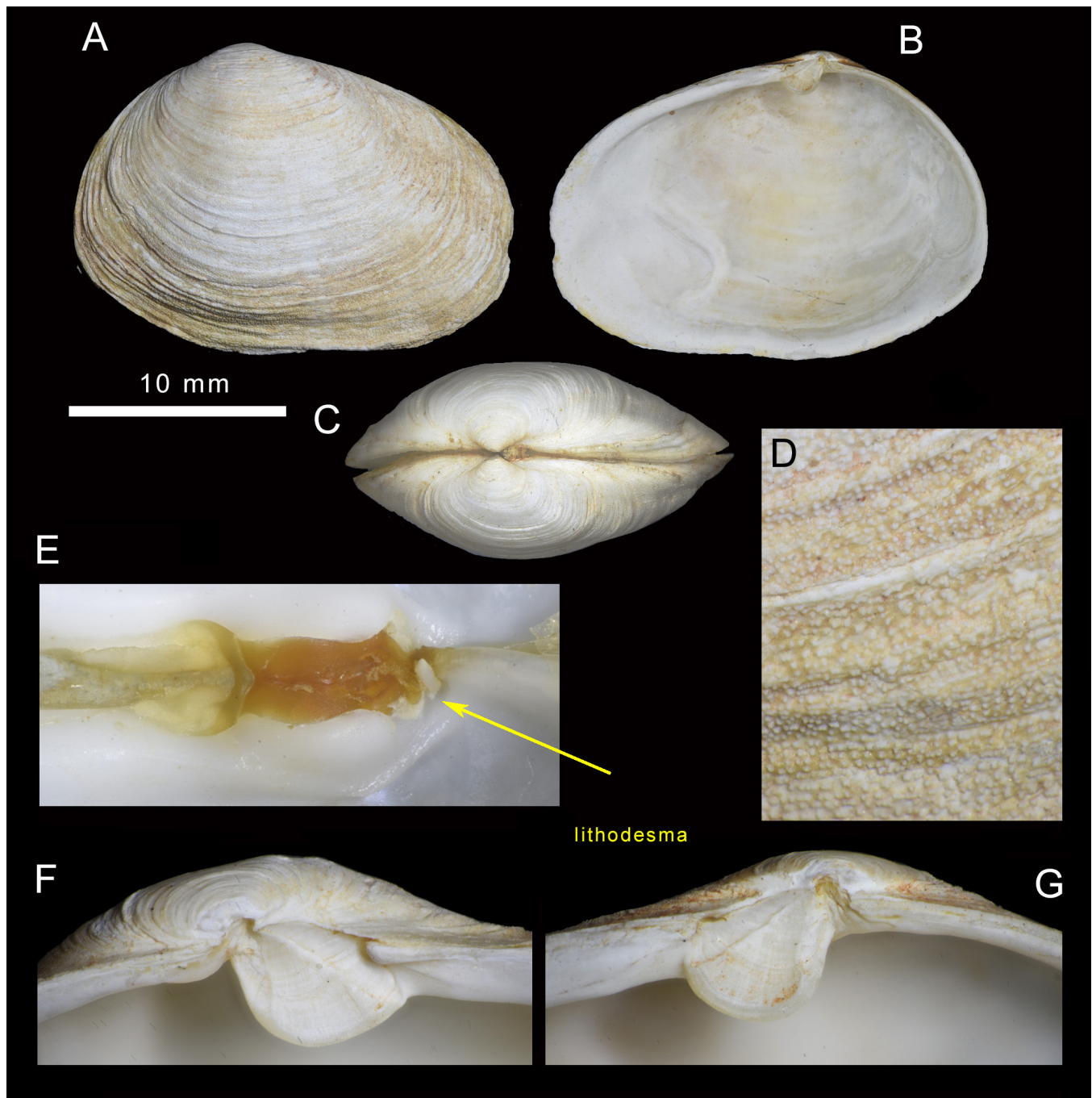
**Generic definition.** Shells to 55 mm long; inequilateral beaks toward anterior; outline irregularly subovate. Surface coarsely granular (Fig. 5D). Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores projecting (Fig. 5F, G); lithodesma small (Fig. 5E); ligament mainly internal, external portion small scarcely arched.

**Remarks.** *Ixartia* was erected by Leach (1852) for the British *Mya distorta* Montagu, 1803 but was ignored by Jeffreys (1865), who placed this species in *Thracia* Blainville, 1824. *Ixartia* remained largely ignored by British authors, including Allen (1961), in his review of British species. The distinctions from other genera, notably *Thracia* s.s., are few and





**Figure 4.** *Pelopina* sp. from Arabian Gulf. **A, B**, shell from Kuwait, external views of left valve and its chondrophore, NMW.Z. 2021.009.24. **C–G**, shell from Saudi Arabia in old museum collection of ARC-EMS, KFUPM. **C**, internal view of right valve, **D**, external view of left valve. **E**, granulation near margin. **F, G**, right and left chondrophores.



**Figure 5.** *Ixartia distorta*, shell from Torbay, England, ex J.T. Marshall coll., NMW. 1955.158. A, B, external and internal of left valve. C, dorsal view of paired valves. D, granulation over posterior ventral surface. E, internal view of the ligament showing lithodesma in situ. F, G, right and left chondrophores.

rest primarily on the distorted outline of the valves. Kamev (2002: table 2) indicated that the lithodesma is absent in *Ixartia*, but this is incorrect and a lithodesma was illustrated by Allen (1961). Consequently, *Ixartia* is recognised only by its distorted outline, which is reflective of the nesting habitat of the species assigned to it.

Other than the irregular outline and anterior placement of the beaks, the chondrophores are shorter and project more deeply below the hinge plate than in *Thracia* s.s. The surface is more distinctly granular, and this granulation is not entirely restricted to the posterior.

**Genus *Pelopina* M. Huber, 2010**

= *Pelopina* H. Adams 1868 (junior homonym of *Pelopina* Meigen, 1800 [Diptera]; *Pelopina* is a replacement name)

**Type species.** *Pelopina brevifrons* H. Adams, 1868 (holotype, NHMUK 1878.1.28.108).

**Other species included.** *Pelopina rudis* Reeve, 1859.

**Generic definition.** Shells to 30 mm long, inequilateral; beaks toward anterior; outline irregularly subovate. Surface coarsely granular. Pallial sinus wide, shallow. Hinge lacking teeth; chondrophores projecting; lithodesma very large disrupting anterior face of chondrophore and creating a large gap in hinge plate; ligament mainly internal, external portion obsolete.

**Remarks.** *Pelopina* differs from *Ixartia* by the presence of a very large lithodesma which fills a deep gap anterior to the chondrophore. The lithodesma restricts the anterior growth of the chondrophore, such that the anterior edge of the chondrophore is rough and straight.

*Pelopina* and *Thracia rudis* share the nestling habit and the presence of a very large lithodesma indicating that the latter should be placed in *Pelopina*.

Comparisons with other genera of Thraciidae reveal that only in *Ixartia* and *Pelopina* are there misshapen nestling forms. In *Ixartia* the lithodesma is very small, contrasting with the relatively massive lithodesma in *Pelopina*, which we feel justifies their generic recognition.

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