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Revision of Cenomanian regular echinoids in collections at the Cairo Geological Museum, Egypt

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ABSTRACT

Cenomanian rocks of Egypt are rich in moderately to well-preserved echinoids. From the large Cretaceous echinoid collection at the Cairo Geological Museum, a total of 27 regular species, in 12 genera, eight families, six orders and two subclasses, are revised and systematically described from these strata as exposed at several localities in Egypt. One new family (Pedinopsidae), one new subfamily (Lorioliinae), one new genus (*Alternocidaris*) and two new species of *Goniopygus*, *G. subaequalis* (Gebel Ekma) and *G. macrotuberculatus* (Gebel El Minsherah), are erected. Additionally, two species of *Diplopodia*, *D. micropyga* Fourtau, 1921 and *D. halperti* Fourtau, 1921, are transferred to the genus *Pedinopsis*.

1. Introduction

Cenomanian strata are well exposed in Egypt, encompassing rocks rich in macrofossil assemblages such as bivalves, gastropods, ammonites, echinoids and corals. The Cairo Geological Museum (CGM) contains a valuable, large collection of Cretaceous echinoids the taxonomy of which was organised by Fourtau between 1898 and 1921 (Fourtau, 1898, 1900, 1901, 1904, 1905, 1906, 1909, 1912, 1913, 1914, 1921). Since then, this collection has not been reassessed taxonomically, which is why an update is urgently needed so to reflect the most recent echinoid classification. In addition, other collections of sea urchins, not previously addressed by specialists, are deposited at the CGM. The goal of the present study is to provide a revised account of regular Cenomanian echinoids in these collections, and those contained in collections made by two of us (GME and MAA), housed at the Geological Museum, Geology Department, Faculty of Science of Benha University (BU) and at the Geological Museum, Ain Shams University (ASU.GM.), Cairo, respectively.

2. Material and methods

The present work is based on regular echinoids recovered from Cenomanian rocks at several localities in Egypt (Fig. 1). Material was prepared, identified and photographed using a digital camera. For more detailed views of important morphological features of a number of key taxa some photomicrographs were taken using a binocular microscope.

3. Systematic palaeontology

For higher-level taxonomy we follow Kroh and Smith (2010), while descriptive terminology is adopted from Durham and Wagner (1966). All linear measurements (taken with a vernier Caliper) are in millimetres.

Abbreviations. **D** = test diameter; **dp** = diameter of peristome; **H** = test height; **Ls** = length of apical disc; **Ws** = width of apical disc; **Wa** = width of ambulacral area at ambitus; **Wi** = width of interambulacral area at ambitus; **Na** = number of tubercles in one ambulacral column; **Ni** = number of tubercles in one interambulacral column; **Lk** = length of periproct; **Wk** = width of periproct; CGM = Cairo Geological Museum; Inv. = Invertebrate; ASU.GM = Geological Museum, Ain Shams University; BU = Benha University; HA = Gebel El Hamra; MN = Gebel El Minsherah;

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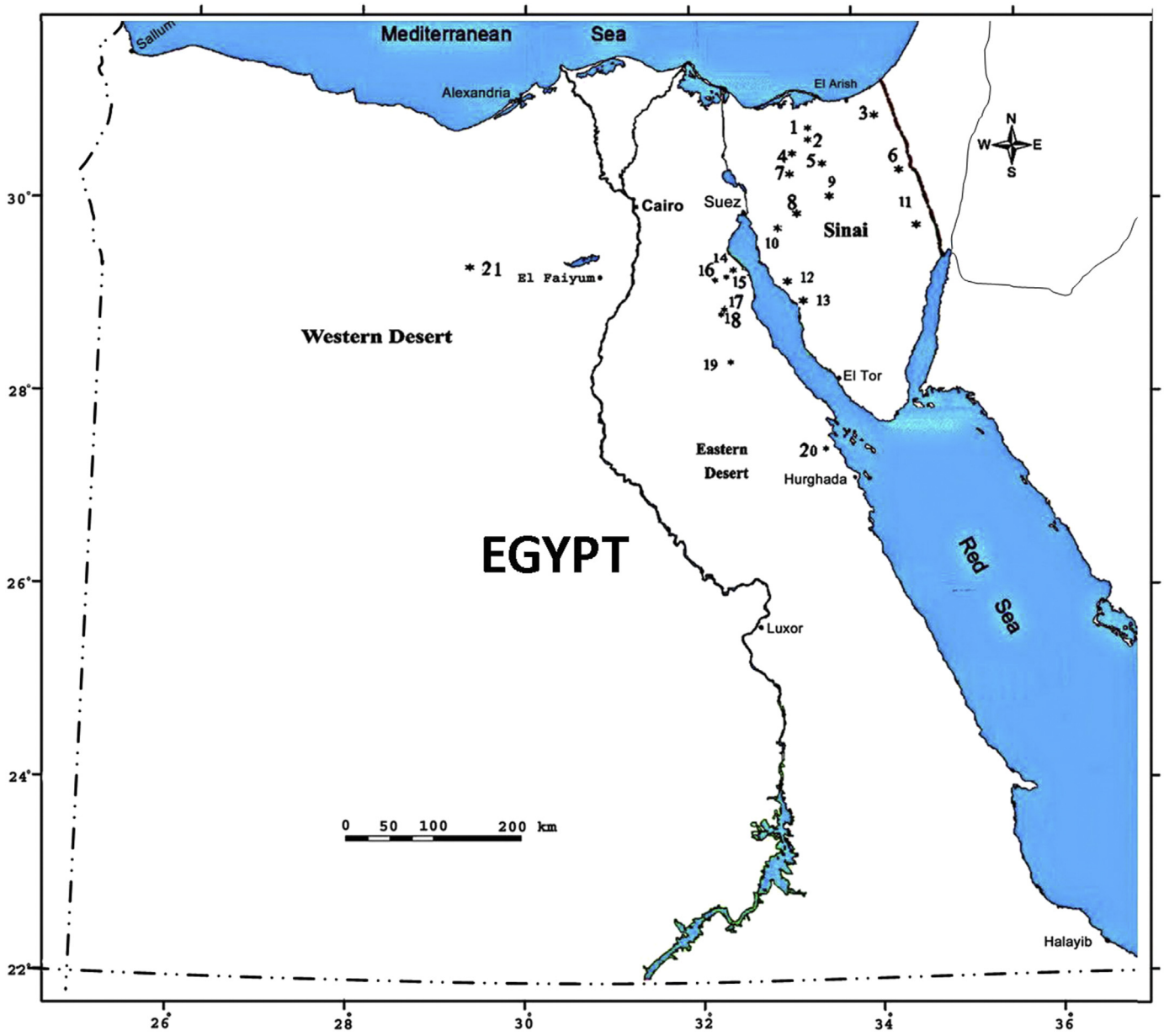

Fig. 1. Locality map showing provenance areas of Cenomanian echinoid material in the collections of the Cairo Geological Museum; 1 – Gebel El-Tourkmania, Bir Salama; 2 – Gebel Manzour, RasWadi Karm, Gebel El-Rekeib, Wadi Maghara; 3 – Gebel Halal; 4 – Gebel Giddi, Gebel El Falig; 5 – Gebel El Minsherah; 6 – Gebel Arif El Naga; 7 – Gebel Um Mitla, Gebel El Hamra; 8 – Wadi Um Hemaiet; 9 – Gebel El Tih; 10 – Gebel Essaylet; 11 – Gebel Guna; 12 – Wadi Abu Edeimat; 13 – Gebel Ekma; 14 – Bir Abu El-Misa, Abu Darag; 15 – Wadi Askhar El-Bahary; 16 – Ain Araidah; 17 – Saint Paul; 18 – Wadi Dakhl; 19 – Wadi Hawashiya; 20 – South Abu Shaar; 21 – El Bahariya Oasis.

EK = Gebel Ekma; SP = Saint (St) Paul; DL = Wadi El Dakhl; DG = Abu Darag; E = echinoids.

Class Echinoidea Leske, 1778
Subclass Cidaroidea Smith, 1984
Order Cidaroida Claus, 1880
Family Cidaridae Gray, 1825
Subfamily Stereocidarinae Lambert, 1900

Genus *Temnocidaris* Cotteau, 1863
Subgenus *Stereocidaris* Pomel, 1883
Type species: Cidaris cretosa Mantell, 1835

Temnocidaris (Stereocidaris) sarracenarum (Fourtau, 1921)
Fig. 2A–G

1921 *Stereocidaris sarracenarum* Fourtau, p. 6, pl. 3, fig. 10.
1933 *Poriocidaris taouzensis* Lambert, p. 61, pl. 2, figs. 1–3.
1990 *Temnocidaris* (*Stereocidaris*) *sarracenarum* (Fourtau); Smith et al., p. 41, fig. 8a.
1993 *Poriocidaris taouzensis* (Lambert); Néraudeau et al., p. 10, pl. 1, fig. A.
1995 *Temnocidaris* (*Stereocidaris*) *sarracenarum* (Fourtau); Néraudeau et al., p. 403, fig. 3(a, b).