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HELIOZOA FROM NIGERIA

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ABSTRACT

A total of seven scaled protistans were observed from four freshwater sites in Nigeria. They include the heliozoan genera Acanthocystis, Polyplacocystis, Pterocystis, and Raphidiophrys. All are new records for Africa.

KEY WORDS: *Heliozoa, Protozoa, Acanthocystis, Polyplacocystis, Pterocystis, Raphidiophrys*

INTRODUCTION

Heliozoans are cosmopolitan, free-living aquatic protozoans. Species are found in marine, brackish and fresh waters. Some species have endosymbiotic algae, but most obtain their nutrition by phagocytosis, usually using characteristically long axopodia and short pseudopodia to capture their food. Recent reviews of the heliozoan have been given by Febvre-Chevalier (1985), Lee *et al.* (1985), Page and Siemensma (1991) and Patterson and Hedley (1992).

The role Protozoa play in aquatic and terrestrial ecosystems have been well established.

Only recently have we begun to understand the biogeography of flagellated Protozoa (Tong *et al.*, 1997 and Literature therein).

While the taxonomy of silica-scale bearing taxa of the golden-brown algae (Chrysophyceae and Synurophyceae) has been affirmed using the structure of their siliceous scales as observed with the electron microscope (Takahashi, 1978; Asmund & Kristiansen, 1986; Siver, 1991). "the use of similar criteria in scale-bearing Protozoa has been slow to develop" (Nicholls, 1983a).

Petersen and Hansen (1960) were the first to describe new species of Heliozoa based on electron microscopy of scales. Since then the literature has

been sporadic. Only the studies of Durrschmidt in Chile, New Zealand and Sri Lanka (1985, 1987a, b), Nicholls and Co-workers in Canada (Nicholls, 1983a,b; Nicholls & Durrschmidt, 1985), Croome and co-workers in Australia (Croome, 1986, 1987a,b,c, Croome *et al.* 1987), Siemensma and Roijackers in The Netherlands and Sweden (Siemensma, 1981; Siemensma & Roijackers, 1988a,b) and Mikrjukov in Rusasia Mikrjukov, 1993a,b, 1994a,b,c, 1995; 1996a,b, 1999,2000a,b) have demonstrated that scale structure in Heliozoa possessing siliceous scales is likely the single most reliable taxonomic criterion. Only one paper from Asia has been published and this was a description of a new *Pterocystis* species from India (Wujek & Elsner, 1992). Previously much of the taxonomy was based on light microscopy of variable cell features (e.g. color, size, vacuolation, etc.) or of scales, the structure of which cannot be determined properly by light microscopy.

The purpose of this paper is to give a taxonomic account of heliozoan species found in south western Nigerian freshwater locations during a survey for silica-scaled chrysophytes (Wujek and Ogundipe, 2002).

MATERIALS AND METHODS

Lugol fixed plankton samples from a wide variety of freshwater habitats in southern Nigeria (Table 1) were examined using transmission and scanning electron microscopy as previously described (Wujek & Ogundipe, 2002).

OBSERVATIONS AND DISCUSSION

Seven species and subspecies of *Acanthocystis*, *Polyplacocystis*, *Pterocystis*, and *Raphidiophrys* were observed from various Nigerian freshwater sites (Table 1, Figs.1– 7). All taxa are new records for Africa.

While there is no consensus for the taxonomy of the Heliozoa, the classification of Page and Siemensma (1991), was followed in this reports. Lee *et al.* (1985) provide an alternative.

Centrohelid Heliozoa

Cells of this group of Heliozoa are free-living or stalked and possess actinopods with long, thin granule-studded axopods which usually arise from a tripartite centroplast. The genus *Acanthocystis* contains more species than any of the other Centrohelida. Cells tend to be round covered by siliceous spine scales with a layer of overlapping body scales.

TABLE 1

Nigerian sites containing heliozoan, March 12 – 17, 2001.

Taxon	Location
<i>Acanthocystis erinaceoides</i>	Works service pond, University of Lagos, Lagos State
<i>Acanthocystis erinaceoides</i> spp <i>undulata</i>	Works service pond, University of Lagos, Lagos State
<i>Acanthocystis foliacea</i> spp <i>foliacea</i>	Works service pond, University of Lagos, Lagos State
<i>Acanthocystis foliacea</i> spp. <i>Elongata</i>	Works service pond, University of Lagos, Lagos State
<i>Pterocystis pinnata</i>	Ogun River, Ogun State
<i>Raphidiophrys intermedia</i>	Tokin, Ogun State
<i>Polyplacocystis marginata</i>	Assess Road, University of Lagos, Lagos State.

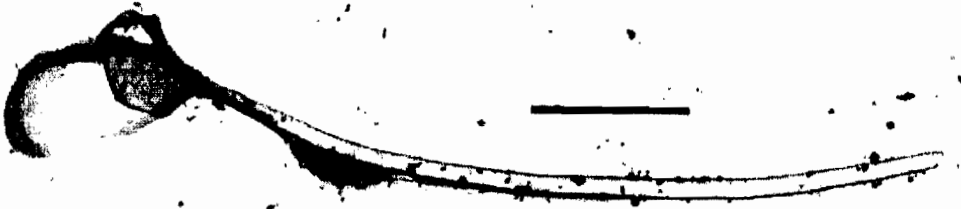


Fig. 1: *Acanthocystis erinaceoides* Petersen & Hansen Fig. 1. (Line scale = 1 μ m)

The first Heliozoan described by electron microscopy (Denmark; Petersen & Hansen, (1960), it has since been reported from Canada (Nicholls, 1983a), Chile (Dürschmidt, 1985), Australia (Croome, 1986) and Germany (Bardele, 1977).

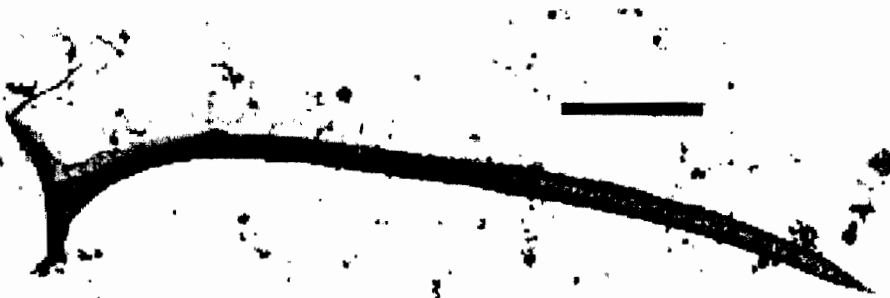


Fig.2 : *Acanthocystis erinaceoides* Petersen & Hansen ssp. *Undulata* Dürschmidt (Line scale = 1 μ m).

Known only from Sri Lanka and Chile (Dürschmidt, 1987b), this is the third world wide report of this taxon.

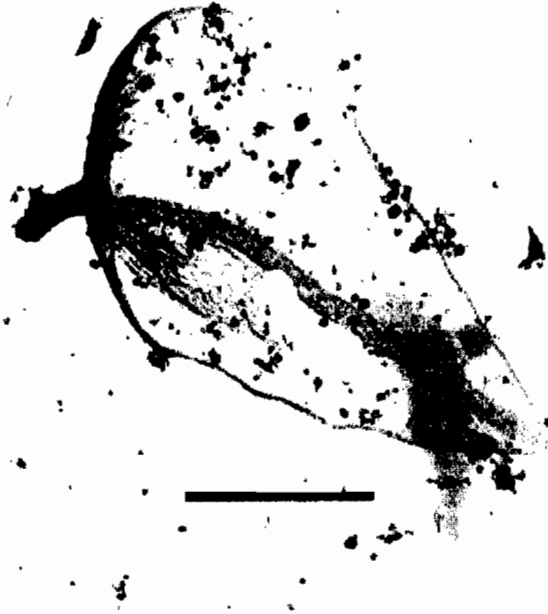


Fig. 3: *Acanthocystis foliacea* Durrschmidt ssp. *foliacea* (Line scale = 1 μ m)

Originally described from Chile (Durrschmidt, 1985), additional sites in Chile, as well as New Zealand, Japan and Sri Lanka (Durrschmidt, 1987a, 87b) and Australia (Croome 1987a,b,c) have been reported.

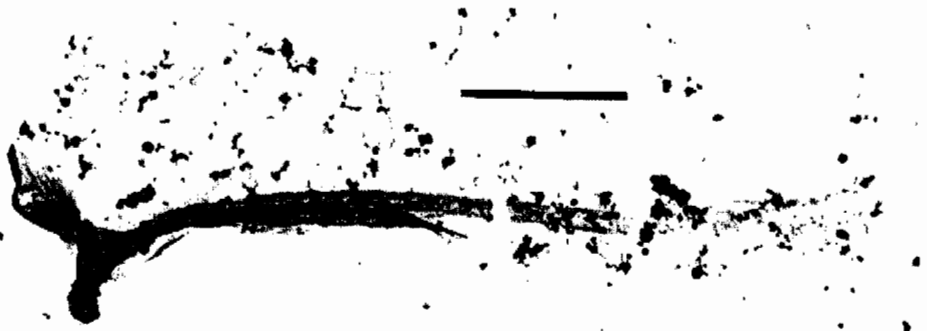


Fig. 4: *Acanthocystis foliacea* Durrschmidt ssp. *elongata* Durrschmidt (Line scale = 1 μ m)

Other reports for this taxon include Chile, Sri Lanka and Japan (Durrschmidt, 1987b), Chile (Durrschmidt, 1985; as *A. foliacea*); and Japan (Takahashi, 1959; as an unidentified microplankton No. 15).



Fig. 5: *Prerocystis pinnata* (Nichools) Siemensma & Roijackers (Line scale = 1 μ m)

Originally described in the genus *Acanthocystis*, Siemensma Roijackers (1988a,b) placed it their newly described genus *Pterocystis*. While this is the first report for Africa, previous reports include those from Canada (Nicholls, 1983a,b)

Cristidisoid Heliozoa

Numerous, but variable shaped cells for this grouping of Heliozoa are coated with overlapping curved, spindle – to circular-shaped plate scales and spine scales sometimes referred to as spicules. In all cristidisoid Heliozoa, cells lack axonemes and extrusomes.



Fig. 6: *Raphidiophrys intermedia* Penard

Previous reports of this taxon are from Canada, Chile, New Zealand and Malaysia (Nicholls & Durrschmidt, 1985), Australia (Croome, 1987 a,b,c,) and The Netherlands and Sweden (Roijackewrs & Siemensma, 1988). Eighteen species are recognized (Mikrjukov, 1994c).

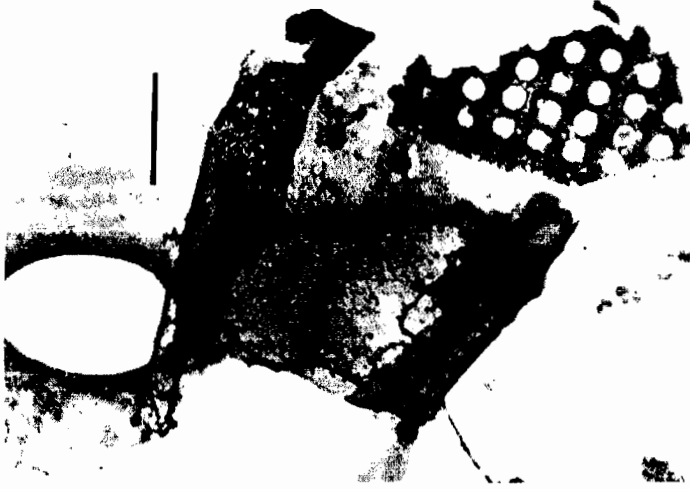


Fig. 7: *Polyplacocystis marginata* (Siemensma) Mikrjukov

This taxon has been previously reported from Canada, Chile, New Zealand, and Sri Lanka (Nicholls & Durrschmidt, 1985) and The Netherlands (Roijackers & Siemensma, 1988).

Unidentified scales

The species list given above is not exhaustive. We observed several other scales, but not in sufficient numbers or with enough detail to emerge with a clear concept of their identities. Collections and observations representing other seasons and from other Nigerian regions will yield additional species.

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