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The IMAM case.
Additional investigation of a micropaleontological fraud

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Abstract: Starting in 1996 and for almost a decade, M.M. IMAM contributed to twelve papers published in international geological journals. These papers dealt with the micropaleontology and biostratigraphy of Cretaceous to Miocene series from Egypt and Libya. They were abundantly illustrated in order to support the author's findings and interpretations. However most photographic illustrations (189 at least) were fabricated with material lifted from the publications of other authors, commonly from localities or stratigraphic intervals other than those indicated by M.M. IMAM.

Key Words: Foraminifera; Corallinales; Dasycladales; Charophyta; fraud; Egypt; Libya.

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Résumé : ***L'affaire IMAM. Compléments d'enquête sur une fraude micropaléontologique.-*** À partir de 1996 et pendant près d'une décennie, M.M. IMAM a contribué à douze articles parus dans des revues géologiques internationales. Ces publications traitent de la micropaléontologie et de la biostratigraphie de séries d'âge Crétacé à Miocène d'Égypte et de Libye. L'iconographie abondante était sensée renforcer la validité des découvertes et interprétations de l'auteur. Or la plupart des illustrations photographiques (189 au moins) ont été fabriquées à partir de photos "empruntées" à des publications d'autres auteurs, le plus souvent provenant de localités ou d'intervalles stratigraphiques autres que ceux indiqués par M.M. IMAM.

Mots-Clefs : Foraminifères ; Corallinales ; Dasycladales ; Charophytes ; fraude ; Égypte ; Libye.

I - Introduction

In the period from 1996 to 2003 before AGUIRRE (2004) made the initial report on the matter, Mo(u)stafa Mansour IMAM published ten papers either alone or as senior author (IMAM, 1996a, 1996b, 1998, 1999, 2000, 2001, 2002, 2003; IMAM & REFAAT, 2000; IMAM & GALMED, 2000), and two papers as junior author (PHILLIP *et alii*, 1997; REFAAT & IMAM, 1999). The fraudulent nature of three papers (IMAM, 1996a, 2003; IMAM & REFAAT, 2000) has been given wide publicity (AGUIRRE, 2004; BOSCH, 2004a, 2004b; ERIKSSON *et alii*, 2004; GRANIER *et alii*, 2008) in the hope of generally deterring such misguided efforts. In order to provide additional support to this inquiry we have undertaken research on the subjects IMAM purportly "investigated" (stratigraphy of North Africa, Near East and Middle East and pertinent microfossils). Our intention is to verify all of the descriptions and stratigraphic ages he assigned his figured specimens in order to substantiate more firmly the probability that his findings are unsupported by any valid data. So far we have found 167 more pirated images to add to the 22 discovered by AGUIRRE (2004). Four of these

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twelve papers (IMAM, 1999, 2001; PHILLIP *et alii*, 1997; REFAAT & IMAM, 1999) were published in the *Journal of African Earth Sciences* and the details of the fraud there were recently exposed in a paper published in that journal (GRANIER *et alii*, 2008). Setting aside the 97 images listed and correlated in that article, 70 remain. As part of a summation of the entire investigation they are discussed in the section that follows.

II - Summary of the fraud

Year 1996

Earlier in his career IMAM was the third author of a paper in the *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen* (YOUSSEF *et alii*, 1988). Following this first promising publication, IMAM (1996a) possibly felt confident enough to submit (in September 1994) a manuscript to the same journal and to

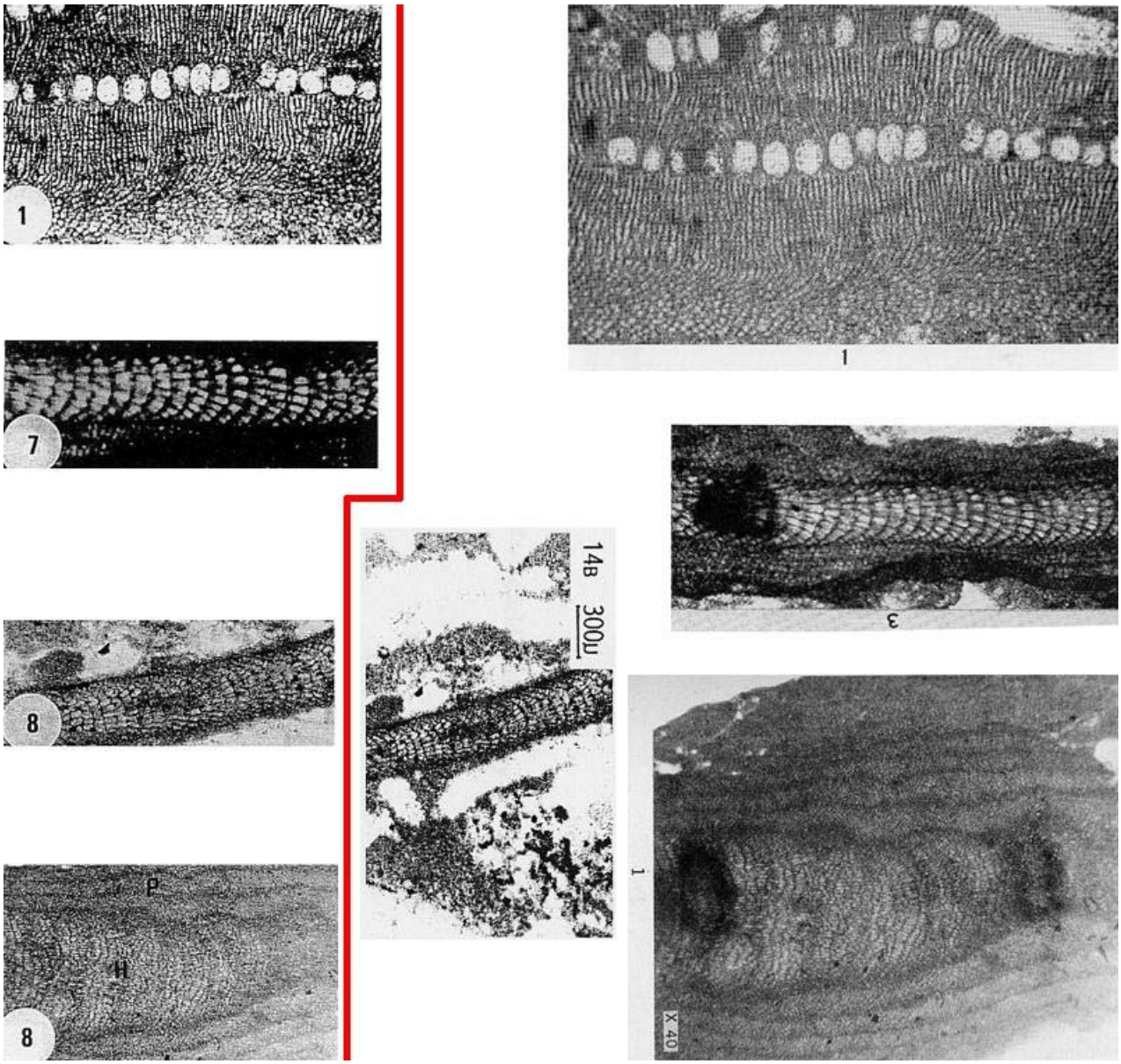

Figure 1: Left side: 4 images duplicated by IMAM (1996a); right side: original images from JOHNSON (1954, 1961) and YOUSSEF *et alii* (1988). [Some rights reserved]

get it published. This paper deals with Coralline (red) algae collected in the Middle Miocene strata of Gebel Gushia (Sinai, Egypt). Surprisingly, the caption for his Fig. 3 (a set of 8 photomicrographs) states aberrantly that the illustrated material is of Middle Eocene (*sic*) age while the legend of his Fig. 4 (a set of 9 photomicrographs) states that the illustrated material is Middle Miocene. AGUIRRE (2004) demonstrated that photomicrograph 3.1 labelled "*Archaeolithothamnium saipanense*" (Fig. 1 top) was reproduced either from JOHNSON (1957: Pl. 37, fig. 10, where it was called "*Lithothamnium* sp." or from his 1961: Pl. 2, fig. 1, "*Archaeolithothamnium*". Note: we found that JOHNSON himself used this photo again in 1963: Pl. 25, fig. 3, here again titled "*Archaeolithothamnium*") and that it was pirated twice more in IMAM & REFAAT (2000: Fig. 7.5) and in IMAM (2003: Pl. 3, fig. 1). In addition (Fig. 1), we verified that:

- photomicrograph 3.7 labelled "*Lithophyllum prelichenoides*" was copied but rotated 180° either from JOHNSON & FERRIS (1949: Pl. 38,

fig. 4, "*Lithophyllum* aff. *prelichenoides*") or from JOHNSON (1961: Pl. 10, fig. 3, "*Lithophyllum*" or 1971: Plate 92, fig. 3, "*Lithophyllum*");

- photomicrograph 3.8 labelled "*Jania guamensis*" was misappropriated from YOUSSEF *et alii* (1988: Fig. 14B, "*Lithophyllum* sp.") and rotated 90° clockwise when published;
- photomicrograph 4.8 labelled "*Lithophyllum kladosum*" was taken from JOHNSON (1954: Pl. 192, fig. 1, "*Lithothamnium kladosum* n.sp.").

In the same year, IMAM (1996b) published in the allied journal *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte* another paper, the manuscript of which was submitted in October 1995. This time he discusses the occurrence of Dasycladalean (green) algae in the Upper Cretaceous strata of Jebel Um Heriba, Sinai, Egypt. His Figure 3 (Fig. 2) consists of a set of 8 photomicrographs. We found that all but two of these images were "borrowed" from OKLA (1991, 1992). The results of our investigation are summarized in this table:

IMAM, 1996b		RADOIČIĆ 2006	CARRAS *et alii*, 2006	OKLA			CARRAS *et alii*, 2006
3.1 a	*Cylindroporella parva*	it is not "*parva*"		**1992**	Pl. III, fig. 2	*Salpingoporella ubaiydhi*	it is "*ubaiydhi*"
3.1 b	*Cylindroporella parva*	it is "*parva*"		**1991**	Pl. 1, fig. 7	*Heteroporella jaffrezoi*	
3.2 a	*Heteroporella lemmensis*			**1992**	Pl. II, fig. 8	*Dissocladella* sp. (it is more probably *Cymopolia* sp.)	
3.2 b	*Heteroporella lemmensis*			**1991**	Pl. 2, fig. 6	*Salpingoporella annulata*	questionable "*annulata*"
3.3	*Salpingoporella annulata*		it is not "*annulata*"	**1991**	Pl. 2, fig. 7	*Salpingoporella annulata*	questionable "*annulata*"
3.5	*Salpingoporella ubaiydhi*		it is "*ubaiydhi*"	**1992**	Pl. III, fig. 4	*Salpingoporella ubaiydhi*	it is "*ubaiydhi*"
3.6	*Trinocladus tripolitanus*			**1992**	Pl. III, fig. 3	*Salpingoporella ubaiydhi*	it is "*ubaiydhi*"

The remaining 2 photomicrographs (Fig. 2) were extracted from E. FLÜGEL (1979):

- photomicrograph Fig. 3.4 labelled "*Salpingoporella milanovici*" is from E. FLÜGEL (1979, Pl. 3, fig. 4: "*Salpingoporella annulata*"; it was re-used in STEIGER & WURM, 1980, pl. 26, fig. 2, and E. FLÜGEL, 1982, pl. 30, fig. 2) [remark: according to CARRAS *et alii*, 2006, it is neither "*milanovici*", nor "*annulata*"];
- photomicrograph Fig. 3.7 labelled "*Cymopolia* cf. *tibetica*" was lifted from E. FLÜGEL (1979, Pl. 3, fig. 5: "*Salpingoporella* cf. *pygmaea*").

In a letter to the editors of the *Revista Española de Micropaleontología*, Imam said "he used other people's photos because he lacked the means to provide good illustrations for his manuscripts" (BOSCH, 2004b). However, this statement is untrue because his images of Dasycladales (Fig. 2) were deliberately altered to conceal their adoption much in the way a stolen car is repainted to hide evidence of the crime.

Year 1997

He was also the second author of a multi-authored paper dealing with planktonic foraminifera, the manuscript of which was submitted in April 1996 to the *Journal of African Earth Sciences* and published the next year (PHILLIP *et alii*, 1997). Some of the photomicrographs of YOUSSEF *et alii* (1988) were re-used there, but as valid reproductions, for both papers investigate the same locality. However the figures 5 to 7 of Plate 1 (that is Figs. 4.5 to 4.7) of PHILLIP *et alii* (1997) are mirror views of the original photomicrographs in YOUSSEF *et alii* (1988, respectively Figs. 5D, 5C and 5A): left-coiling planktonic foraminifera are converted into right-coiling ones, and vice-versa (Fig. 3).

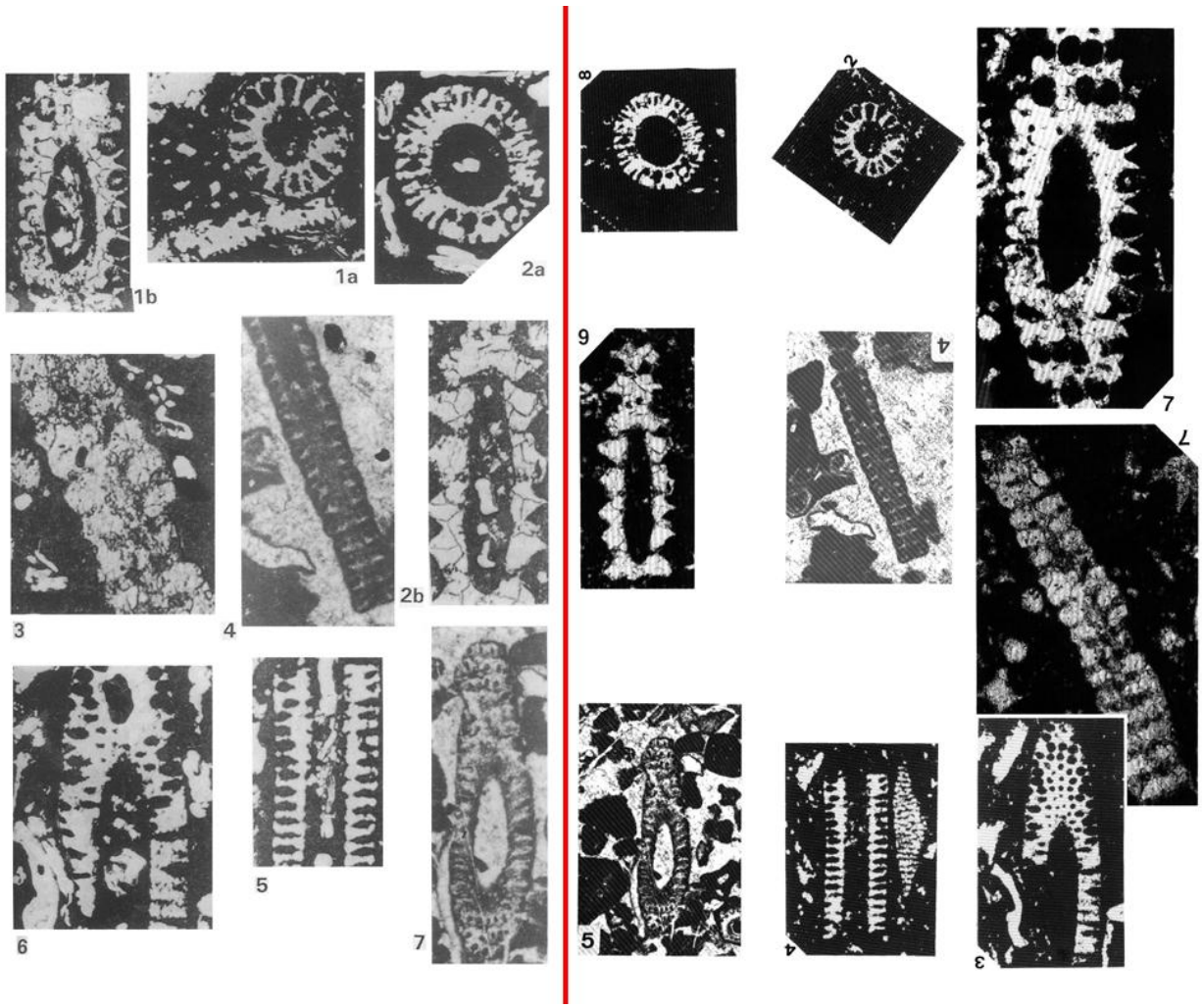

Figure 2: Left side: Figure 3 of IMAM (1996b); right side: original images from OKLA (1991, 1992) and E. FLÜGEL (1979). [Some rights reserved]

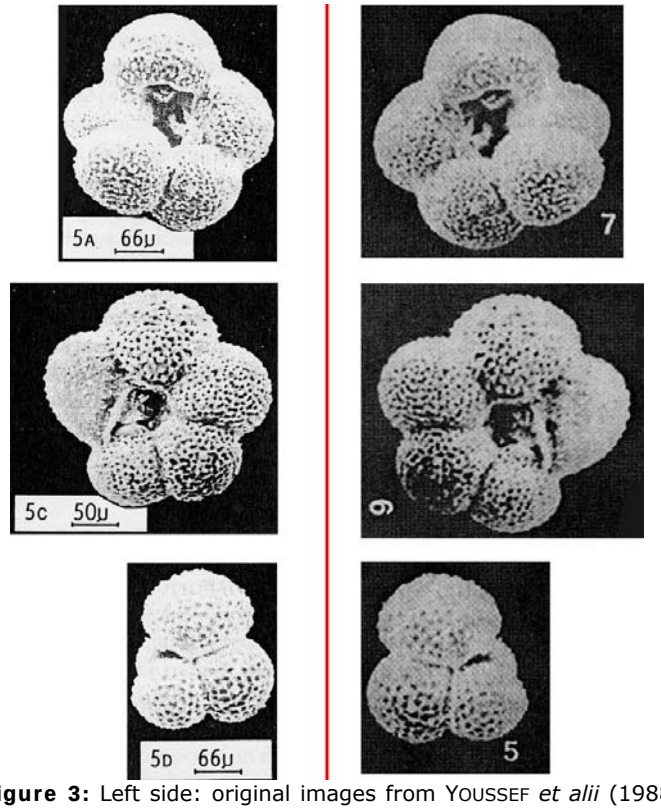

Figure 3: Left side: original images from YOUSSEF *et alii* (1988 as 5A- *Globigerina ciperoensis*, 5C- *G. angustiumbilicata*, and 5D- *G. builloides*); right side: 3 photomicrographs of PHILLIP *et alii* (1997 as *Globigerina ciperoensis ciperoensis*, *G. ciperoensis angustiumbilicata*, and *G. eamesi*). [Some rights reserved]

Year 1998

1998 marks IMAM's return to the *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte* with a manuscript submitted in May 1997. This article deals with the description of a new species of planktonic foraminifer: *Clavatorella salumensis* n.sp. But his Figure 3.1, called the "holotype", is in fact the holotype of *Protentella* (*Clavatorella*) *nicobarensis* SRINIVASAN et KENNETT, 1974 (*op. cit.*: Pl. 3, fig. 11), which these authors also illustrated in 1975: Pl. 3, fig. 11. IMAM's Figures 3.2 and 3.3, his "paratypes", were also taken from the same paper (SRINIVASAN & KENNETT, 1975: Pl. 3, respectively figs. 12 and 13, a paratype and a topotype of their species). On the basis of an excerpt from IMAM's text: "The new species also shows a great resemblance to *Clavatorella nicobarensis* SRINIVASAN & KENNETT but differs in that the latter taxon (*Clavatorella nicobarensis*) has less swollen extremities of the ultimate chambers and the specimen figured by SRINIVASAN & KENNETT (1974) (pl. 1, Figs. 1, 11) is almost biumbilicate", so we can state that following this piece of deceit IMAM felt confident he would never be caught.

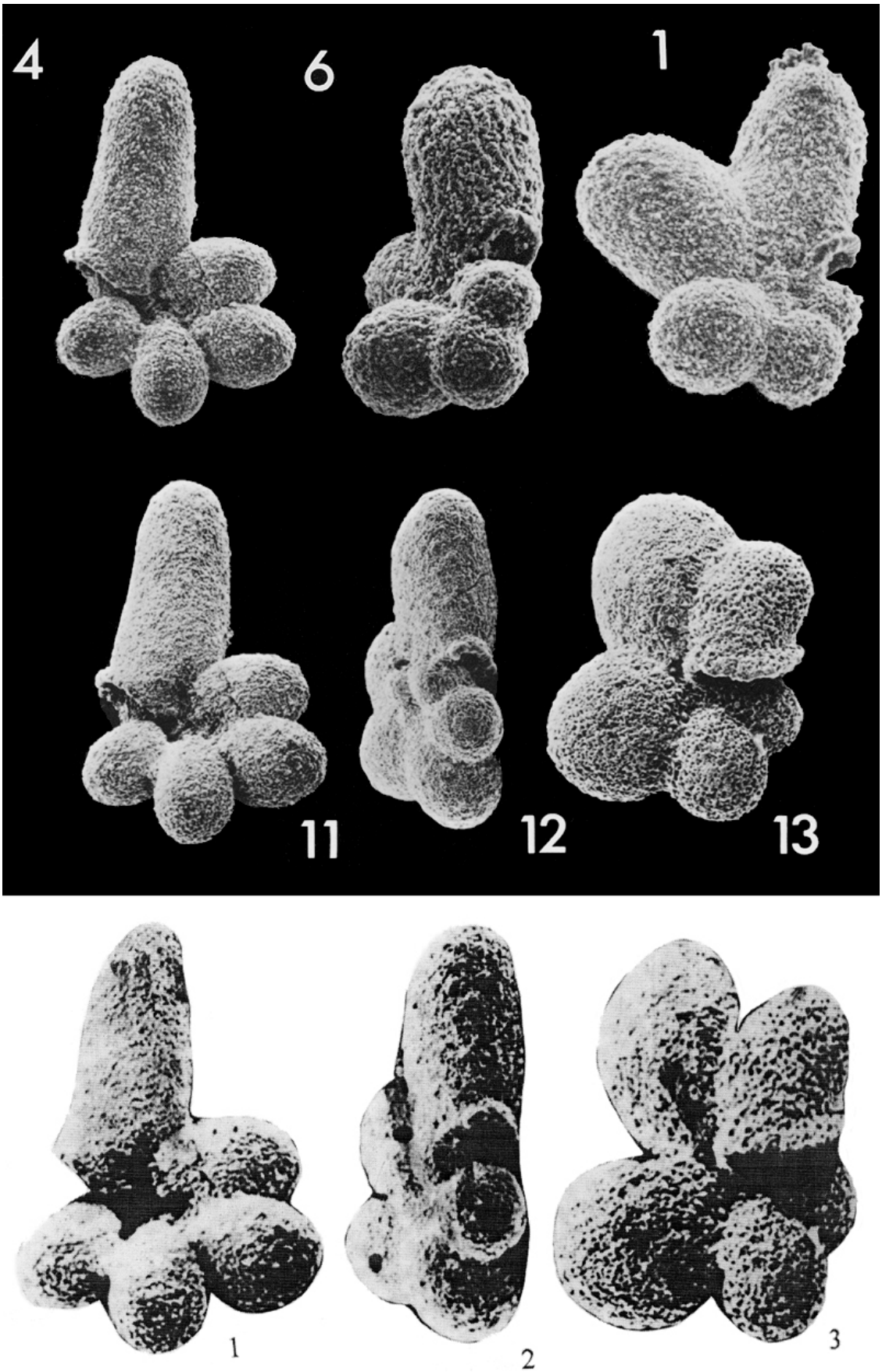

Figure 4: First row: 4) holotype, 6) and 1) two paratypes of *Protentella* (*Clavatorella*) *nicobarensis* SRINIVASAN et KENNETT, 1974, original images from SRINIVASAN & KENNETT (1974). Second row: 11) holotype, 12) paratype and 13) topotype of *Protentella* (*Clavatorella*) *nicobarensis* SRINIVASAN et KENNETT, 1974: original images from SRINIVASAN & KENNETT (1975, re-used by the authors, KENNETT & SRINIVASAN, 1983: Pl. 55, figs. 6-8). Third row: "holotype" and "paratypes" of *Clavatorella salumensis* IMAM, 1998: the 3 images duplicated by IMAM (1998). [Some rights reserved]

Year 1999

Possibly because his earlier multi-authored contribution was published in that journal (PHILLIP *et alii*, 1997), IMAM was privileged to publish two additional papers in the *Journal of African Earth Sciences* (REFAAT & IMAM, 1999; IMAM, 1999).

The first paper (REFAAT & IMAM, 1999, submitted in July 1998) deals with Charophytes collected in Upper Eocene strata at Abu Zenima, Sinai, Egypt. Their figures 9 and 10 are respectively 22 and 16 gyrogonites. All these 38 images were "borrowed" from 4 publications (FEIST-CASTEL, 1977; FEIST & RINGEADE, 1977; GRAMBAST & GRAMBAST-FESSARD, 1981; GRAMBAST-FESSARD, 1980). The details of this fraud were recently published (see GRANIER *et alii*, 2008).

Most figures have been reproduced without modifications, but in 3 cases the image has been rotated 180° and gyrogonites appear with their bases oriented upwards (Fig. 5):

- Pl. III, fig. 1 of GRAMBAST & GRAMBAST-FESSARD (1981) is reproduced as Fig. 9.15 in REFAAT & IMAM (1999);
- Pl. XIII, fig. 9 of FEIST & RINGEADE (1977) is figured as Fig. 10.7 in REFAAT & IMAM (1999);
- Pl. IV, fig. 9 of FEIST-CASTEL (1977) is figured as Fig. 10.6 in REFAAT & IMAM (1999).

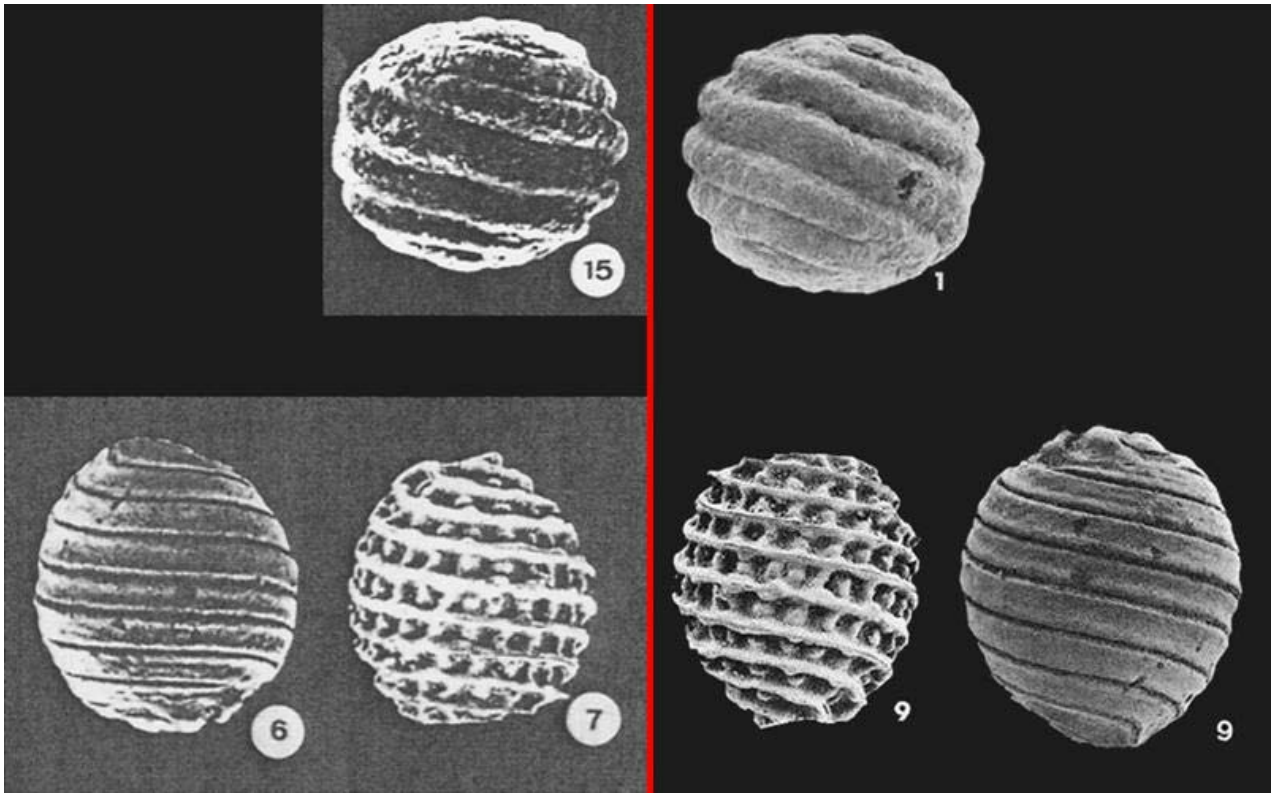

Figure 5: Left side: 3 photomicrographs of REFAAT & IMAM (1999 as 15- *Sphaerochara olmensis*, 6- *Stephanochara vectensis*, and 7- *Rhabdochara major*); right side: original images from GRAMBAST & GRAMBAST-FESSARD (1981 as 1- *Gyrogona morelleti* n.sp.), FEIST & RINGEADE (1977 as 9- *Rhabdochara langeri*) and FEIST-CASTEL (1977 as 9- *Stephanochara oodea* n.sp.). [Some rights reserved]

The second paper (IMAM, 1999, submitted in October 1997) deals with planktonic foraminifera collected from Upper Eocene to Middle Miocene strata in the Al Bardia area, northeastern Libya. His figures 8 and 9 consist of 32 images, all plagiarized from one publication (WATERS & SNYDER, 1986). The details of this fraud were recently published (see GRANIER *et alii*, 2008).

Year 2000

As AGUIRRE (2004) reported, in the paper of IMAM & REFAAT (2000) published in the *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte* and dealing with an Egyptian Miocene series, "only" 2 photomicrographs (*op. cit.*: Fig. 7.5 and 7.6) were pirated from JOHNSON (1961: Pl. 2, fig. 1 & Pl. 10, fig. 2) but these 2 photomicrographs and 3 other were re-used in IMAM's Libyan Miocene paper (2003).

That same year, images from several papers on charophytes were misappropriated by IMAM (2000, submitted in September 1998) in his monograph on charophytes from Mizdah (NW Libya) published in the *Arab Gulf Journal of Scientific Research*. As in the paper by REFAAT & IMAM (1999), species names from the original publications have been changed, including:

- the specimens of *Atopochara trivolovis trivolvis* from the type locality in Texas, figured by SOULIÉ-MÄRSCHE (1994) and renamed *Flabellochara harrisi*;
- those of *Stephanochara berdotensis* (Characeae), illustrated by FEIST & RINGEADE (1977) and assigned to a *Porochara* (Porocharaceae).

One photomicrograph is duplicated (IMAM, 2000: Pl. 1, figs. 5 and 14) and the source of only two of the other photomicrographs (IMAM, 2000: Pl. 1, figs. 7 and 13B) could not be determined.

IMAM, 2000		SOULIÉ-MÄRSCHE, 1994		
Pl. 1, fig. 1	*Atopochara trivolvis trivolvis*	Fig. 5.6 rotated 90° left	*Atopochara trivolvis trivolvis*	Lower Cretaceous
Pl. 1, fig. 2	*Atopochara trivolvis trivolvis*	Fig. 5.5 rotated 180°	*Atopochara trivolvis trivolvis*	Lower Cretaceous
Pl. 1, fig. 4	*Flabellochara harrisi*	Fig. 5.3 rotated 90° left	*Atopochara trivolvis trivolvis*	Lower Cretaceous
Pl. 1, fig. 5	*Lamprothamnium cylindericum*	**Fig. 8.3** (1)	*Lamphrothamnium cylindricum*	Lower Cretaceous
Pl. 1, fig. 6	*Lamprothamnium cylindericum*	Fig. 8.9 rotated 90° left	*Lamphrothamnium cylindricum*	Lower Cretaceous
Pl. 1, fig. 7B	*Platychara grambastii*	Fig. 8.11	*Lamphrothamnium cylindricum*	Lower Cretaceous
Pl. 1, fig. 13A	*Porochara anlunesis*	Fig. 8.1	*Lamphrothamnium cylindricum*	Lower Cretaceous
Pl. 1, fig. 14	*Porochara* sp. B	**Fig. 8.3** (2)	*Lamphrothamnium cylindricum*	Lower Cretaceous
IMAM, 2000		**FEIST & RINGEADE, 1977**		
Pl. 1, fig. 3	*Flabellochara harrisi*	Pl. X, fig. 11 rotated 30° left	*Harrisichara subteres* n.sp.	Lower Miocene
Pl. 1, fig. 8	*Porochara douzensis*	Pl. XIII, fig. 1	*Stephanochara berdotensis* n.sp. (Holotype, profile)	Lower Miocene
Pl. 1, fig. 11A	*Porochara palmeri*	Pl. XIII, fig. 10	*Rantzieniella nitida*	Lower Miocene
Pl. 1, fig. 11B	*Porochara palmeri*	Pl. XIII, fig. 11	*Rantzieniella nitida*	Lower Miocene
Pl. 1, fig. 12B	*Sphaerochara* sp.	Pl. XIII, fig. 5 rotated 135° right	*Stephanochara berdotensis* n.sp.	Lower Miocene
IMAM, 2000		**MARTIN-CLOSAS & GRAMBAST-FESSARD, 1986**		
Pl. 1, fig. 10A	*Porochara maestrica*	Pl. II, fig. 1	*Musacchiella maestratica* n.sp. (Holotype, vue latérale)	Lower Cretaceous
Pl. 1, fig. 10B	*Porochara maestrica*	Pl. II, fig. 4 rotated 90° left	*Musacchiella maestratica* n.sp.	Lower Cretaceous
Pl. 1, fig. 12A	*Porochara* sp. A	Pl. I, fig. 8	*Musacchiella* sp.	Lower Cretaceous
IMAM, 2000		**FEIST & GRAMBAST-FESSARD, 1984**		
Pl. 1, fig. 9	*Porochara douzensis*	Fig. 4C rotated 180°	*Musachiella douzensis* n.sp.	Middle Jurassic
Pl. 1, fig. 15	*Porochara douzensis*	Fig. 4B	*Musachiella douzensis* n.sp.	Middle Jurassic

Year 2001

Again in the *Journal of African Earth Sciences* (2001, manuscript submitted in August 1999) IMAM 's Fig. 6 illustrates 26 SEM photographs of foraminifera: only one, the source of his Fig. 6.6 ("*Abathomphalus mayaroensis*"), was not identified, all the the remaining material was lifted from PETTERS (1983). The details of this fraud are exposed in GRANIER *et alii* (2008).

Year 2002

IMAM (2002, manuscript submitted in September 2000 to the *Revista Española de Micropaleontología*) deals with the Early Pliocene series of the Western Desert in Egypt. His biostratigraphy is based on planktonic foraminifera and his Plate 1 consists of 20 photomicrographs of them. However all the figures were extracted from CHAISSON & LECKIE (1993). Correlations are detailed in the table below:

IMAM (2002)		CHAISSON & LECKIE (1993)	
Pl. 1, fig. 1	*Globrotalia* (sic) *aequilateralis*	Pl. 1, fig. 1	*Globigerinella aequilateralis*
Pl. 1, fig. 2	*Globorotalia obesa*	Pl. 1, fig. 3	*Globigerinella obesa*
Pl. 1, fig. 3	*Globorotalia obesa*	Pl. 1, fig. 4	*Globigerinella obesa*
Pl. 1, fig. 4	*Globigerina apertura*	Pl. 1, fig. 6	*Globigerina apertura*
Pl. 1, fig. 5	*Globigerina decoraperta*	Pl. 1, fig. 7	*Globigerina decoraperta*
Pl. 1, fig. 6	*Globigerina druryi*	Pl. 1, fig. 10	*Globigerina druryi*
Pl. 1, fig. 7	*Globigerina nepenthes*	Pl. 1, fig. 11	*Globigerina druryi*
Pl. 1, fig. 8	*Globigerina bulloides*	Pl. 1, fig. 14	*Globigerina bulloides*
Pl. 1, fig. 9	*Globigerina woodi*	Pl. 1, fig. 18	*Globigerina woodi*
Pl. 1, fig. 10	*Globigerinoides obliquus obliquus*	Pl. 2, fig. 2	*Globigerinoides obliquus*
Pl. 1, fig. 11	*Globigerinoides obliquus extremus*	Pl. 2, fig. 3	*Globigerinoides extremus*
Pl. 1, fig. 12	*Globigerinoides trilobus*	Pl. 2, fig. 15	*Globigerinoides triloba*
Pl. 1, fig. 13	*Globigerinoides sacculifer*	Pl. 2, fig. 16	*Globigerinoides sacculifer*
Pl. 1, fig. 14	*Globorotalia scitula*	Pl. 4, fig. 7	*Globorotalia praescitula*
Pl. 1, fig. 15	*Globorotalia margaritae*	Pl. 6, fig. 9	*Globorotalia margaritae*
Pl. 1, fig. 16	*Sphaeroidinellopsis seminulina*	Pl. 10, fig. 11 rotated 90° left	*Sphaeroidinellopsis seminulina*
Pl. 1, fig. 17	*Sphaeroidinellopsis seminulina*	Pl. 10, fig. 12	*Sphaeroidinellopsis seminulina*
Pl. 1, fig. 18	*Sphaeroidinellopsis kochi*	Pl. 10, fig. 15	*Globigerina druryi-Sphaeroidinellopsis disjuncta*
Pl. 1, fig. 19	*Sphaeroidinellopsis praedehiscens*	Pl. 10, fig. 9	*Sphaeroidinellopsis praedehiscens*
Pl. 1, fig. 20	*Globorotaloides hexagona*	Pl. 9, fig. 4	*Globigerina angulisuturalis*

Year 2003

AGUIRRE (2004) made an excellent review of the most recent IMAM publication (2003, manuscript submitted in September 2002 to the *Revista Española de Micropaleontología*). But as he focused narrowly on the red algae and microfacies, his report fell short of the exhaustive. We augment its coverage hereinafter. In his investigations of the red algae, AGUIRRE (2004) found that:

- the photomicrographs of red algae in IMAM's Pl. 5, figs. 2 and 4 are respectively those of Pl. 10, figs. 1 and 2 of JOHNSON (1961). He did not mention that both of these illustrations had been first published, respectively as Pl. 6, fig. D and Pl. 7, fig. D of JOHNSON & FERRIS (1950), which were reprinted once more by JOHNSON himself (1971: Plate 92, figs. 1 and 2);
- IMAM's Pl. 5, fig. 9 corresponds to Pl. 26, fig. 3 of JOHNSON (1963). He neglected to mention that JOHNSON (1961) had reproduced it from Pl. IX, fig. 2 of PFENDER (1926).

As reported by AGUIRRE (2004), IMAM also transferred microfacies micrographs from a paper he co-authored (YOUSSEF *et alii*, 1988) as described here.

IMAM (2003)		YOUSSEF *et alii* (1988)	
Pl. 6, fig. 6	Miocene, Libya	Fig. 12A	Miocene, Egypt
Pl. 7, fig. 1	Miocene, Libya	Fig. 9B	Miocene, Egypt
Pl. 7, fig. 8	Miocene, Libya	Fig. 13C	Miocene, Egypt
Pl. 7, fig. 9	Miocene, Libya	Fig. 6B	Miocene, Egypt

We also found that he duplicated the same pictures to illustrate Miocene and Oligocene microfacies which we chronicle below.

IMAM (2003)		IMAM & GALMED (2000)	
Pl. 6, fig. 3	Miocene, Libya	Pl. 17, fig. 6	Oligocene, Libya
Pl. 7, fig. 4	Miocene, Libya	Pl. 17, fig. 7	Oligocene, Libya

The primary additions supplementing AGUIRRE's work concern planktonic foraminifera. They are summarized in the following tables:

Original photomicrographs			IMAM (2003)	
PETTERS (1983)	Pl. 4, fig. 4	*Subbotina triloculinoides* see Fig. 6	Pl. 2, fig. 1	*Globigerinoides trilobus* see Fig. 6
	Pl. 4, fig. 3	*Subbotina triloculinoides* see Fig. 6	Pl. 2, fig. 2	*Globigerinoides immaturus* see Fig. 6
	Pl. 8, fig. 11	*Globigerinoides trilobus*	Pl. 2, fig. 3	*Globigerinoides trilobus*
	Pl. 8, fig. 16	*Globigerinoides succulifer*	Pl. 2, fig. 4	*Globigerinoides succulifer*
	Pl. 8, fig. 20	*Globigerinoides ruber*	Pl. 2, fig. 5	*Globigerinoides subquadratus*
	Pl. 8, fig. 27	*Globoquadrina globosa*	Pl. 2, fig. 10	*Globoquadrina dehiscens*
	Pl. 8, fig. 6	*Globigerinoides sacculifer*	Pl. 2, fig. 14	*Globigerinoides succulifer* (sic)
CHAISSON & LECKIE (1993)	Pl. 9, fig. 5	*Globoquadrina baroemoenensis*	Pl. 2, fig. 6	*Globigerina bulloides*
	Pl. 9, fig. 9	*Globoquadrina* ? cf. *G. extans*	Pl. 2, fig. 8	*Globigerina angustiumbilicata*
LECKIE *et alii* (1993)	Pl. 9, fig. 9	*Globigerina ciperoensis*	Pl. 2, fig. 7	*Globigerina ciperoensis*
	Pl. 9, fig. 10	*Globigerina ciperoensis*	Pl. 2, fig. 9	*Globigerina angulisuturalis*
	Pl. 9, fig. 1	*Globigerina angulisuturalis*	Pl. 2, fig. 11	*Globigerina angulisuturalis*
	Pl. 7, fig. 19	*Cassigerinella chipolensis*	Pl. 2, fig. 13	*Cassigerinella chiploensis* (sic)
BERGGREN & NORRIS (1997)	Pl. 4, fig. 1	*Subbotina triloculinoides*	Pl. 2, fig. 12	*Globigerinnella* (sic) *obesa*

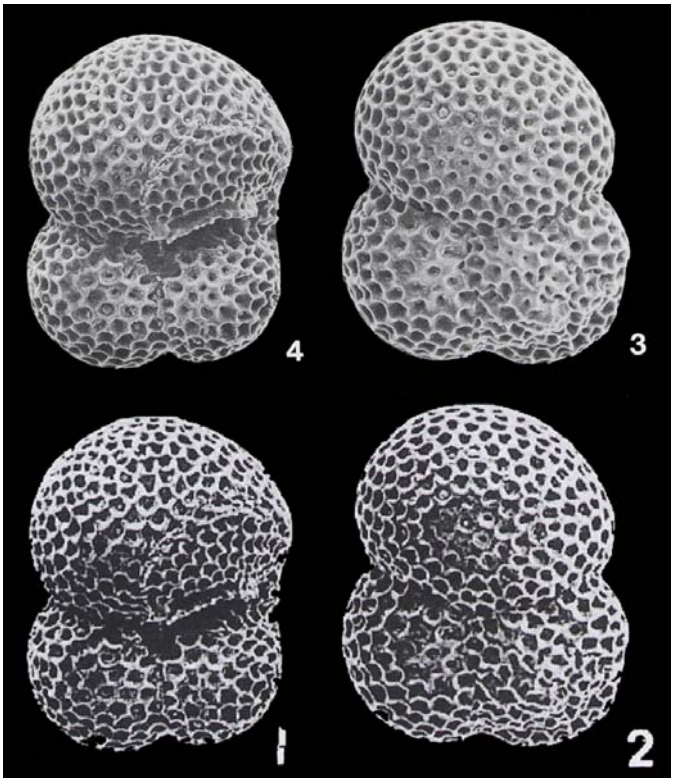

Figure 6: Upper row: two images from PETTERS (1983, both *Subbotina triloculinoides*); lower row: the two photomicrographs of IMAM (2003, as n° 1 labelled *Globigerinoides trilobus* and n° 2 called *G. immaturus*). *Nota bene*: the form illustrated here as *Globigerinoides trilobus* had already appeared in IMAM (2001: Fig. 6.25) as *Subbotina triloculinoides.* [Some rights reserved]

Though we are quite suspicious regarding the source of the illustrations for the remaining material, particularly the benthic foraminifers, we were not able to demonstrate that these photomicrographs were "lifted" from the publications of other authors.

III - Discussion

The fraud (see definitions in ADDISON, 2001, and SCOTT-LICHTER *et alii*, 2006) was exposed because the author pretended that he himself illustrated his material.

Most photographic illustrations were "borrowed" from the publications of other authors, with or without manipulation. In papers dealing with fossil red or green algae (see Figs. 1-2 , for instance), there are obvious evidence of fabrication: cropping (see IMAM, 1996a, Figs. 3.1 & 3.8), grouping (see IMAM, 1996b, Figs. 3.1.a & 3.6), masking (see IMAM, 1996b, Figs. 3.1.b, 3.2.a-b & 3.3), *etc.*. On the contrary, in most papers dealing with foraminifers or charophytes, the images were lifted without significant changes, except for a flip (mirror image) or a rotation (a number of degrees, 90°, or upside down):

- the same foraminifers appear as left coiled in the first paper and right coiled in the next paper or vice-versa (Fig. 3), possibly because IMAM (first in YOUSSEF *et alii*, 1988, then in PHILLIP *et alii*, 1997) neglected to assure

the use of the same side of the negative;

- some gyrogonites (IMAM in REFAAT & IMAM, 1999) appear with a odd orientation (Fig. 5), that is with their base oriented upward contrary to a basic rule of charophyte iconography.
- Such errors demonstrate IMAM's woeful ignorance of the conventions in both fields of micropaleontology. If the first example is not easy to detect by the reviewers, the second should have alerted any charophyte-expert, if one had been requested to review the manuscript before its publication.
- In several cases, even images of type material (holotypes, paratypes, topotypes) were copied. Paleontologists know that the name of a fossil is attached to its type specimen and that this material is commonly used as the reference for comparison with new findings, therefore choosing photomicrographs of holotypes as IMAM did repeatedly is possibly the most stupid of his falsifications:
- Fig. 9.2 of REFAAT & IMAM (1999) is the holotype of *Harrisichara heteromorpha* GRAMBAST-FESSARD, 1980;
- their Fig. 9.4 & 9.10 are discrete views of the holotype of *Harrisichara muricata* GRAMBAST-FESSARD, 1980;
- their Fig. 9.6 is the holotype of *Harrisichara regularis* GRAMBAST-FESSARD, 1980;
- their Figs. 9.11, 9.12 & 9.14 are discrete views of the holotype of *Nitellopsis helicteres minor* GRAMBAST-FESSARD, 1980;
- their Fig. 9.15 is the holotype of *Gyrogona morelleti* GRAMBAST et GRAMBAST-FESSARD, 1981;
- their Fig. 9.17 is the holotype of *Gyrogona lemani capitata* GRAMBAST et GRAMBAST-FESSARD, 1981;
- their Fig. 10.14 is the holotype of *Gyrogona lamarcki* GRAMBAST et GRAMBAST-FESSARD, 1981;
- Pl. 1, fig. 8 of IMAM (2000) is the holotype of *Stephanochara berdotensis* FEIST et RINGEADE, 1977;
- his Pl. 1, fig. 10A is the holotype of *Musacchiella maestratica* MARTIN-CLOSAS et GRAMBAST-FESSARD, 1986;
- IMAM's masterpiece, *i.e.* Figs. 3.1-3 of IMAM (1998), supposedly documenting the type-material of "his new species" *Clavatorella salumensis*, which is actually the type-material of *Protentella* (*Clavatorella*) *nicobarensis* SRINIVASAN et KENNETT, 1974.

Again such plagiarism should have alerted experts on charophytes or on planktonic foraminifers, if either had been asked to evaluate these manuscripts before their publication. Duplicated photomicrographs in some publications are commonly due either to a careless mistake or to inadequate knowledge of the studied field (see for instance KHALIFA *et alii* (1986): figure 1 in their Pl. 1 is the exact copy of figure 2 in the same plate, but it is rotated 90° clockwise).

Some microfossils were designated by a specific name other than that ascribed it originally (see tables above and in GRANIER *et alii*, 2008). IMAM commonly altered valid names of species to make them conform to Cenozoic charophyte biozonation, a fact which testifies to his dishonest intent.

Certain aberrancies in stratigraphic distribution should have warned specialists about the low degree of credibility to be accorded these articles and all the works of this author. For instance, the green algae *Otternstella lemmensis* (BERNIER) (formerly known as *Heteroporella*) and *Salpingoporella annulata* CAROZZI had never been reported in strata younger than Valanginian; their recording by IMAM (1996b) in Upper Cretaceous strata ought to have warned the specialists about a misidentification; actually it did so but we could hardly have imagined that the specimens illustrated were not from the author's collection. Charophyte gyrogonites were reported by IMAM from stratigraphic intervals other than the interval supposedly studied. As such the misdated co-occurrence of Late Eocene and Early Miocene gyrogonites in Upper Eocene sediments (REFAAT & IMAM, 1999) and that of specimens of Mid Jurassic, Early Cretaceous and Early Miocene age in one locality (IMAM, 2000) should have puzzled the reviewers.

According to REFAAT & IMAM (1999, p. 1, lines 24-25 of their Abstract) their specimens were "illustrated for the first time" from remote localities in Egypt and Libya, from which additional samples would not be easy to obtain. Because none of the figured specimens actually came from Egyptian and Libyan localities the existence of these microfossils and even of the strata supposedly sampled becomes problematic. In this regard, it is significant that no redepositories are listed for any of these specimens. Consequently, and obviously by design, verification of IMAM's "findings" is not possible.

IMAM's fabricated data started polluting later publications and might have affected to some degree the validity of their conclusions (see for instance the recent papers of GAMEIL (2003), KIESSLING *et alii* (2003), LEPPARD & GAWTHORPE (2006), JACKSON *et alii* (2005, 2006) and SMITH & DALLA VECCHIA (2006).

IV - Conclusion

The issue of image verification should become mandatory soon, for conventional methods of photography (emulsions on film of halides of silver) are being replaced by electronic methods (Fig. 7) that are even easier to manipulate (SCOTT-LICHTER *et alii*, 2006).

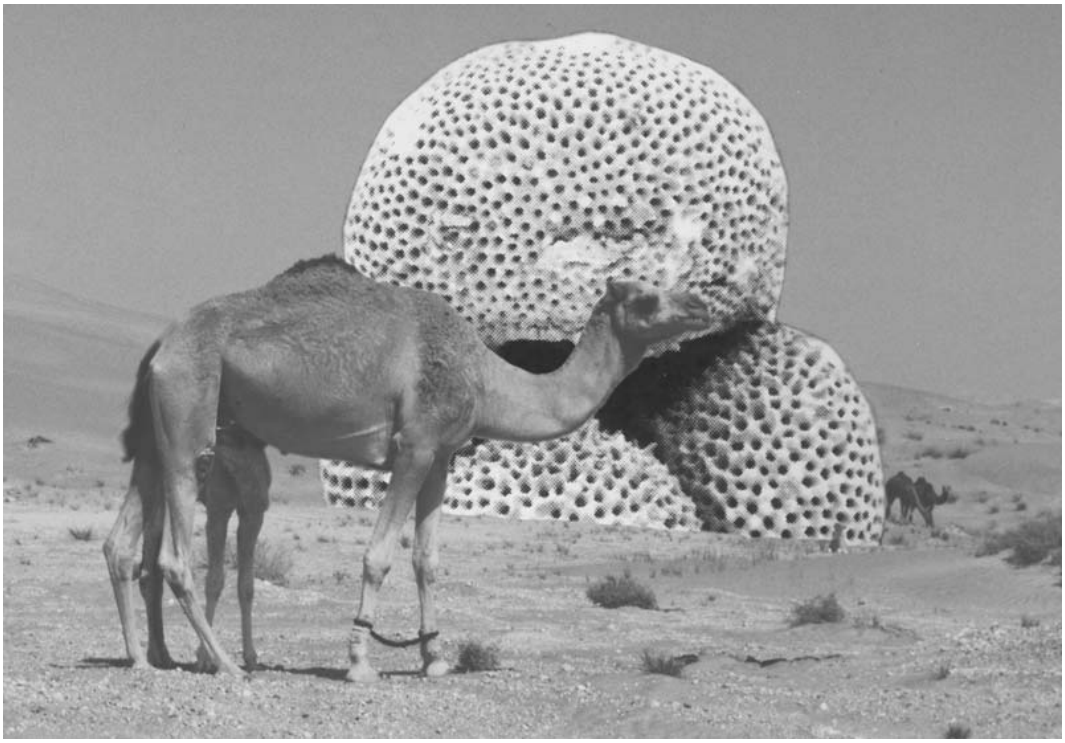

Figure 7: Find of a giant planktonic foraminifer in a remote area of the Middle East. An obvious montage made with a common photo editor. The particular example is easily detectable because pixel sizes in the paste-up vary widely.

The most regrettable aspect of these frauds is that the discredit tarnishes not only the coauthors who, in other cases of this type (the GUPTA frauds, brought to light by TALENT *et alii*, 1988, supplemented by TALENT, 1989), have been presumed innocent. Publishers should try prevent such misconduct, not only for legal reasons (infringement of the copyright rules) but also because it tarnishes the reputation of established journals and their editorial committees. This IMAM fraud had the "merit" of revealing a flaw in our system of evaluation for contributions to scientific publications. What would have occurred if the author had chosen not to illustrate "his" material? This poses the question: What degree of credibility should be given to publications without illustrations or, as in a case recently documented by BILOTTE *et alii* (2007), that came with poor illustrations? To insure against fraud editors should demand that authors document the material with photos (whether or not the manuscript is illustrated by their use) that provide the bases for publication (or at least its most significant elements) and that they indicate a public site (Museum, national collection, *etc.*) where this material, properly referenced, will be permanently accessible to the scientific community. However one reviewer (R.S.) reminded us that "a basis for good science is trust" (we agree); he also stated that such "drastic measures" will not be beneficial to science in introducing "more bureaucracy". While reviewing a manuscript IMAM submitted to the *Revista Española de Micropaleontología* AGUIRRE (2004) was able to identify an image pirated from his own work (AGUIRRE *et alii*, 1993); thanks to this image identification it was then possible to ask the author to retract his submission. In conclusion, reviewers are -and will remain- the keystone in evaluation (see ADDISON, 2001; SCOTT-LICHTER *et alii*, 2006; GRANIER, 2007). But, if the submittal passes peer-review undetected, subsequent exposure through later identification of pirated material remains probable (SCOTT-LICHTER *et alii*, 2006), as demonstrated herein.

Acknowledgements

Carnets' publications are usually licensed under the Creative Commons Attribution 2.5 License. But the material illustrated herein was *de facto* published earlier in other journals and some rights are therefore reserved. Special thanks are due to the editors of *Géologie méditerranéenne*, *Journal of African Earth Sciences*, *Journal of foraminiferal Research*, *Revue de Paléobiologie*, ... who granted us permission to re-use this material. Alternatively the "fair use" clause fully applies as it was implemented to better document the fraud. The first author (B.G.) would like to thank the many

persons who unreservedly supported him in his quest to unearth this blatant and long-lived fraud. Thanks are due too to Michel BILOTTE and Robert SPEIJER for their accurate quality check of the manuscript, and special thanks to Nestor SANDER who helped make this critique easier to read.

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