

## **Anania, a new Cretaceous planktonic foraminiferal genus with meridional rugosity**

Hamed A. EL-NAKHAL<sup>1</sup>

### **Abstract**

*Anania* n. gen., is introduced to include the Cretaceous planktonic foraminiferids that possess umbilical-extraumbilical primary aperture, supplementary sutural apertures on the umbilical side, inflated chambers, and meridionally arranged rugosity, which have been previously assigned to *Ticinella* and *Hedbergella*. Both *Ticinella* sp. cf. *T. roberti* (GANDOLFI), and *Hedbergella costellata* SAINT-MARC, of CARON (1978) which display meridional rugosity and supplementary sutural apertures, are treated as new species and formally named as *Anania caronae*, and *A. shobairi*, respectively. The definitions of Rugoglobigerinacea and Abathomphalidae are emended, and the Ananiinae is introduced as a new subfamily to accommodate *Anania* n. gen.

### **Keywords**

Cretaceous, planktonic foraminifera, meridional rugosity, Atlantic Ocean.

### **I. INTRODUCTION**

In her study of the Cretaceous planktonic foraminifera of the southeastern Atlantic Ocean (CARON, 1978), recorded several rotaliporids with meridionally arranged surface rugosity, some of which possessed supplementary sutural apertures on the umbilical side. Accepting the hypothesis of the environmental significance of test ornamentation CARON (*op. cit.*) considered the meridional rugosity as a character of specific importance and hence, she assigned her meridionally costellate species to *Hedbergella* and *Ticinella*.

Meridionally costellate rotaliporids have been described and illustrated by numerous workers other than CARON (1978), (e. g. CARON, 1966; MARIANOS & ZINGULA, 1966; DOUGLAS & SLITER, 1966; DOUGLAS, 1969; SAINT-MARC, 1973; FONDECAVE, 1975; KASSAB, 1976 and PETERS, 1980). Depreciating the taxonomic value of that type of surface ornamentation, those authors assigned their meridionally costellate species to existing genera such as *Hedbergella*, *Whiteinella*, *Praeglobotruncana*, *Loeblichella*, and *Ticinella*.

In Globotruncanidae, the meridional rugosity was assigned a generic or suprageneric importance (BRÖNNIMANN, 1952; SUBBOTINA, 1959; PESSAGNO, 1967; EL-NAKHAL, 2002 and GEORESCU, 2005), and several genera were erected on the basis of the presence of this type of ornamentation such as *Rugoglobigerina*, *Plumerita*, *Trinitella*, and *Rugotruncana*. In Rotaliporidae however, the meridional rugosity was given little taxonomic importance. EL-NAKHAL (1973) was one of the first workers who pointed out its value in the taxonomy of the rotaliporids. In 1982, 1984, and 2002

we introduced the three genera *Meridionalla*, *Kassabella* and *Badriella*, respectively, on the basis of the occurrence of the meridional rugosity. Furthermore, we included all the Cretaceous planktonic foraminiferal genera displaying meridional rugosity, within the superfamily Rugoglobigerinacea (EL-NAKHAL, 2002).

The meridionally costellate *Hedbergella* species of CARON (1978) can simply be assigned to *Meridionalla* (EL-NAKHAL, 1982). In contrast, the *Ticinella* species which display that type of ornamentation and have supplementary sutural apertures cannot be assigned to *Ticinella* nor to any of the existing planktonic foraminiferal genera, as the meridional rugosity has been accepted by most authors, as a character of generic, or suprageneric importance. Accordingly, *Anania* is erected here as a new genus to accommodate these forms.

### **II. SYSTEMATICS**

The classification followed in the present study is that of EL-NAKHAL (2002), Table 1.

**Order Foraminiferida EICHWALD, 1830**  
**Suborder Globigerinina DELAGE & HEROUARD, 1896**  
**Superfamily Rugoglobigerinacea SUBBOTINA, 1959**  
**(in RAUZER-CHERNUSOVA & FURSENKO, 1959)**  
**emend.**

**Diagnosis:** Globigerinina with meridionally costellate ornamentation.

Table 1: Classification of the superfamily Rugoglobigerinacea SUBBOTINA, 1959, (after EL-NAKHAL, 2002, with modifications).

Superfamily Rugoglobigerinacea					
		Family Rugoglobigerinidae	Family Abathomphalidae		
Primary aperture		Umbilical	Umbilical-extraumbilical to spiroumbilical		
Supplementary sutural apertures		Without supplementary sutural apertures	Subfamily Abathomphalinae Without supplementary sutural apertures		Subfamily Ananiinae With supplementary sutural apertures
Apertural flaps		Tegilla	Tegilla	Portici	Portici
Chambers	Globular to ovate throughout	<i>Rugoglobigerina</i> BRÖNNIMANN, 1952	<i>Kassabella</i> EL-NAKHAL, 1984	<i>Meridionalla</i> EL-NAKHAL, 1982	<i>Anania</i> n. gen.
	Compressed later chambers	<i>Trinitella</i> BRÖNNIMANN, 1952	<i>Abathomphalus</i> BOLLI, LOEBLICH & TAPPAN, 1957	<i>Badriella</i> EL-NAKHAL, 2002	---
	Radially elongate later chambers	<i>Plummerita</i> BRÖNNIMANN, 1952	---	---	---

**Emended description:** Test trochospirally enrolled, chambers globular, radially elongate, or angular and may have peripheral imperforate carinal band; wall calcareous, perforate; surface with pustules, rugosities, and costellae in a meridional pattern; primary aperture umbilical, umbilical-extraumbilical to spiroumbilical, bordered by a lip, or covered by tegilla; with or without supplementary sutural apertures on the umbilical side.

**Remarks:** Description of the Rugoglobigerinacea is emended to accommodate the supplementary sutural apertures on the umbilical side, a character performed by the new genus *Anania*.

**Range (emended):** Middle Albian - Maastrichtian (Fig. 1).

#### Family Abathomphalidae PESSAGNO, 1967 emend.

**Diagnosis:** Rugoglobigerinacea with umbilical-extraumbilical, to spiroumbilical primary aperture with porticus or tegilla, and with or without supplementary sutural apertures on umbilical side.

**Emended description:** Test trochospiral, chambers globular to compressed, axial periphery rounded or angular to truncate, with or without imperforate peripheral band, sutures radial to curved, depressed to raised, with or without supplementary sutural apertures on umbilical side, wall calcareous perforate, surface with meridionally arranged pustules and costellae on one or

both sides, primary aperture umbilical-extraumbilical to spiroumbilical with porticus at least in the early stage, later may have tegilla.

**Remarks:** The description of Abathomphalidae is emended to accommodate the supplementary sutural apertures.

**Range (emended):** Middle Albian – Maastrichtian

#### Subfamily Ananiinae EL-NAKHAL n. subfam.

**Type genus:** *Anania*, EL-NAKHAL n. gen.

**Diagnosis:** Abathomphalidae with supplementary sutural apertures on umbilical side.

**Description:** Test trochospirally enrolled, chambers globular throughout, wall calcareous, perforate, surface with pustules, rugosities and costellae arranged in a meridional pattern, primary aperture umbilical-extraumbilical with a bordering lip, supplementary sutural apertures exist on umbilical side.

**Range:** Middle - Late Albian.

#### Genus *Anania* EL-NAKHAL n. gen.

**Type species:** *Anania caronae* EL-NAKHAL n. sp. [= *Ticinella* sp. cf. *T. roberti* (GANDOLFI), of CARON (1978), p. 660, pl. 6, figs. 3, 4].

**Diagnosis:** Ananiinae with globular chambers and supplementary sutural apertures on umbilical side.

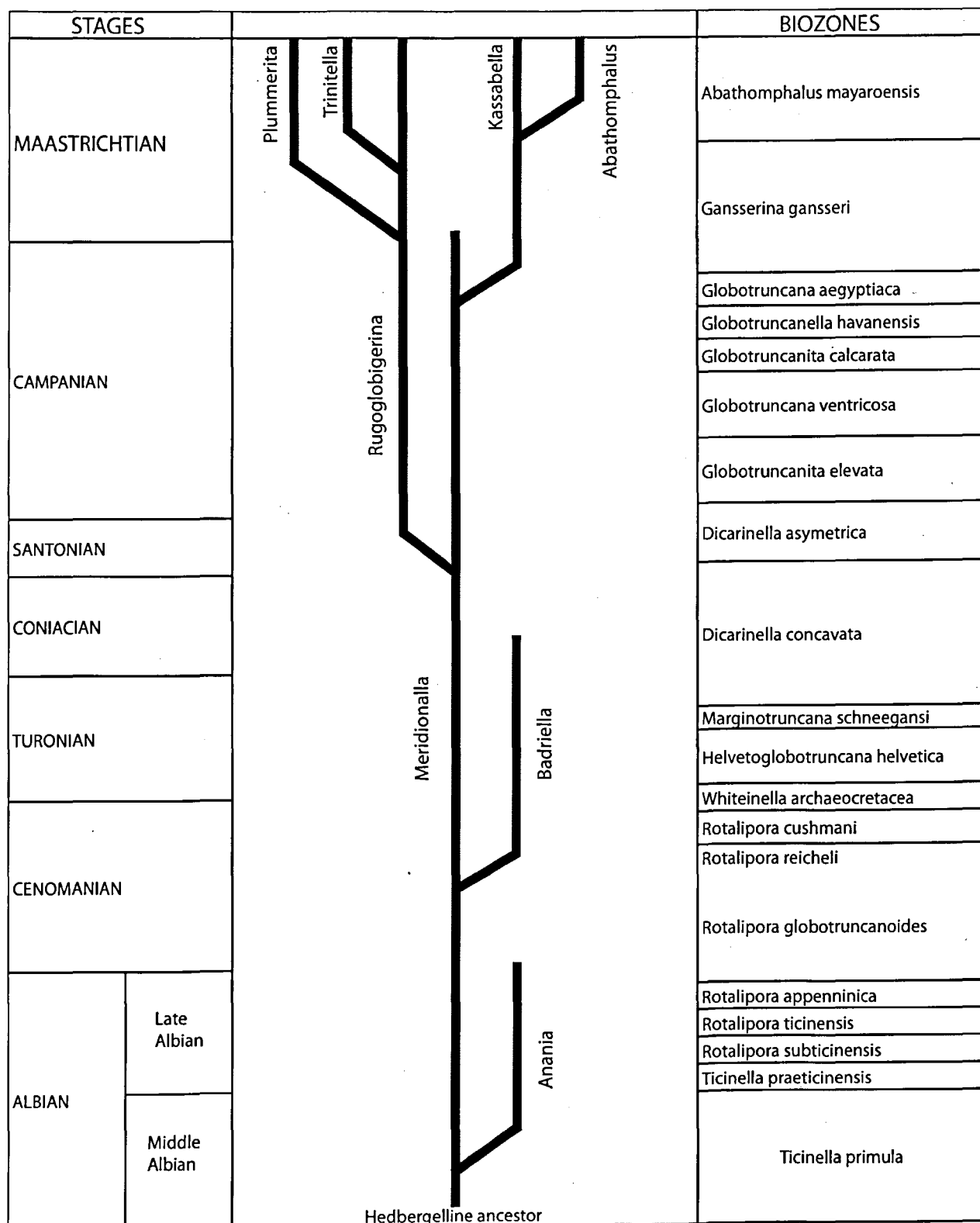


Fig. 1: Phylogeny and stratigraphical ranges of the members of the Rugoglobigerinacea at the generic level (after EL-NAKHAL, 2002, with modifications; biozones after ROBASYNSKI & CARON, 1995).

**Description:** Test free, trochospirally enrolled, umbilicate; equatorial periphery lobate; axial periphery rounded with no indication of keel or poreless margin; chambers inflated; sutures straight, radial depressed on both sides; umbilicus narrow; primary aperture single, umbilical-extraumbilical with bordering lip; supplementary sutural apertures present on the umbilical side; surface rugose covered with meridionally arranged pustules and costellae on one or both sides; wall calcareous, hyaline radial in structure, perforate; lips, and surface rugosity are generally without pores.

**Remarks:** *Anania* n. gen. differs from *Ticinella* by its meridionally arranged rugosity which is lacking in the latter genus. The supplementary sutural apertures distinguish the present new genus from all of the other Rugoglobigerinacea genera which lack such apertures. Additionally, the umbilical-extraumbilical primary aperture and its lip distinguish *Anania* from *Rugoglobigerina*, *Trinitella* and *Plumerita* which have umbilical aperture with tegilla. Also the inflated chambers differentiate *Anania* from *Trinitella*, *Abathomphalus* and *Badriella* which have compressed chambers, and from *Plumerita* which has radially elongate chambers.

**Derivation of name:** The present new genus is named in honor of Prof. Dr. Haidar S. ANAN, of the Department of Geology, Al-Azhar University of Gaza, Palestine, in recognition of his contribution to the field of micropaleontology.

**Range:** Middle - Late Albian.

***Anania caronae* EL-NAKHAL n. sp.**

**Pl. I, figs. 1 - 3**

1978. *Ticinella* sp. cf. *T. roberti* (GANDOLFI), CARON, p. 660, pl. 6, figs. 3, 4, designated as the holotype of *Anania caronae* n. sp.

1978. *Ticinella* sp. cf. *T. roberti* (GANDOLFI) → *Biticinella*, CARON p. 660, pl. 6, figs. 1, 2.

**Diagnosis:** Test with 6 inflated, equal chambers, in the last whorl.

**Description:** (described holotype on Pl. I, figs. 1 - 3)

Test free, coiled in a low trochospire; equatorial periphery circular, lobate; axial periphery rounded; the last whorl consists of 6 globigerine, inflated chambers which are almost equal in size; sutures straight, radial, depressed on both sides; umbilicus narrow, deep; primary aperture single, interiomarginal, umbilical-extraumbilical, bordered with a thin lip; supplementary sutural apertures exist on the umbilical side only; surface covered with meridional costellae on both sides; wall calcareous, hyaline, perforate, except for the imperforate lip and surface rugosity.

**Remarks:** The present new species is distinguished by its 6, inflated, almost equal chambers of the last whorl.

**Dimensions of holotype:** Maximum diameter (of the spiral side) 0.522 mm, minimum diameter (of the spiral side): 0.411 mm.

**Type locality:** The holotype from site 364, Angola Basin, sample 30, CC, southeastern Atlantic Ocean (CARON, 1978).

**Range:** Middle - Late Albian of Angola Basin, southeastern Atlantic Ocean (CARON, 1978). Also, this species occurs in the lower parts of the Upper Albian sequence of Morocco (CARON, written communications).

**Depository:** The figured holotype is deposited in the Museum of Natural History, Basel, Switzerland, under the number C 33.795 (CARON, 1978).

**Derivation of name:** This new species is named in honor of Prof. Dr. M. CARON of the Institute of Geology, University of Fribourg, Switzerland, in recognition of her contribution to the field of micropaleontology.

***Anania shobairi* EL-NAKHAL n. sp.**

**Pl. I, figs. 4-9**

Plate I

(All the figured holotypes and paratypes are from the Middle - Late Albian of Angola Basin, southeastern Atlantic Ocean, after CARON, 1978). The scale bars account for 0.1 mm.

Figs. 1-3: *Anania caronae* EL-NAKHAL, n. sp., holotype [= *Ticinella* sp. cf. *T. roberti* (GANDOLFI), CARON, 1978, p. 660, pl. 6, figs. 3-4].

Figs. 1, 2: Spiral and umbilical views, respectively.

Fig. 3: Detail of fig. 2.

Figs 4-9: *Anania shobairi* EL-NAKHAL, n. sp.

Figs. 4-6: **Holotype** (= *Hedbergella costellata* SAINT-MARC; CARON, 1978, p. 658, pl. 4, figs. 1 -3).

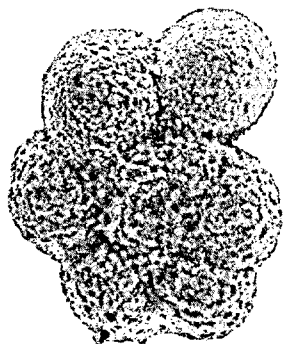
Figs. 4, 5: Spiral and umbilical views, respectively.

Fig. 6: Detail of fig 2.

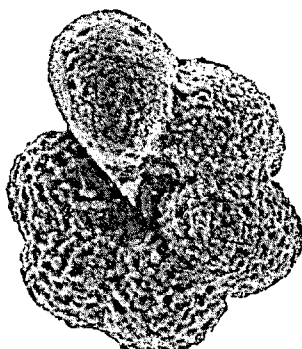
Fig. 7: Umbilical view, **paratype** with 5 chambers (= *Hedbergella* sp. cf. *H. costellata* SAINT-MARC; CARON, 1978, p. 665, pl. 4, fig. 8).

Fig. 8: Umbilical view, **paratype** with 6 chambers (= *Ticinella* sp. ? with "costellae" and supplementary apertures, CARON, 1978, p. 668, pl. 5, fig. 8).

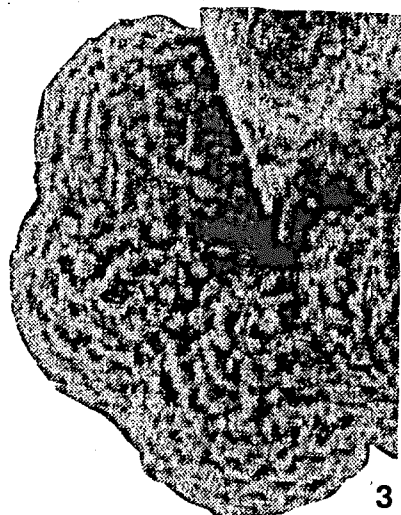
Fig. 9: Detail of Fig. 8.



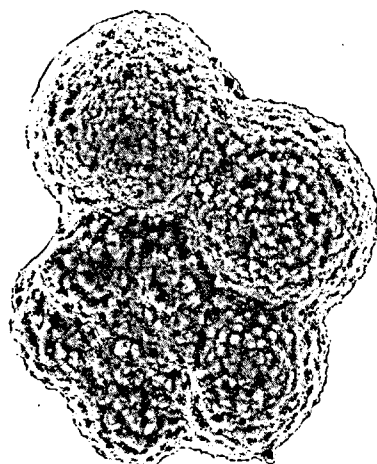
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2



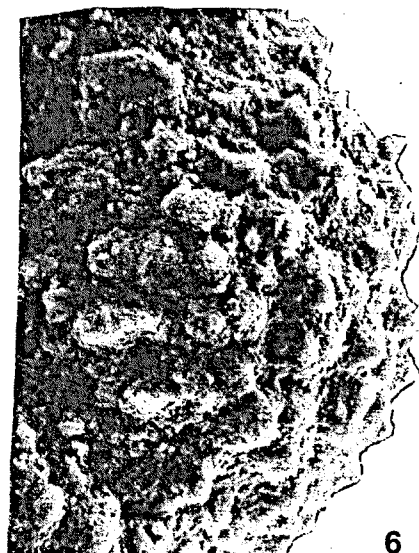
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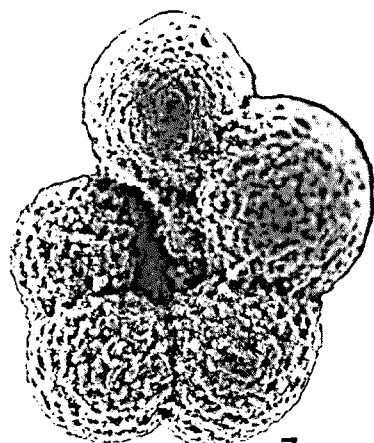
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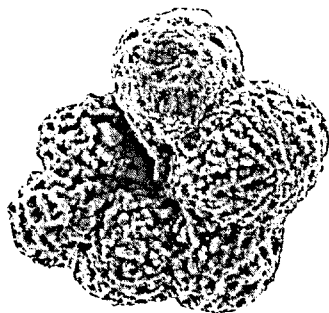
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6



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8



9

1978. *Hedbergella costellata*, SAINT-MARC; CARON, p. 658, pl. 4, figs. 1-3, designated as the holotype of the present new species.
1978. *Hedbergella* sp. cf. *H. costellata* SAINT-MARC; CARON, p. 665, pl. 4, fig. 8.
1978. *Ticinella* sp. ? with "costellae" and supplementary apertures; CARON, p.668, pl. 5, figs. 7, 8.

**Diagnosis:** Last whorl consists of 5 - 6, inflated chambers which increase rapidly in size as ad ded.

**Description:** (described holotype on Pl. I, figs. 4-6)

Test free, coiled in a low trochospire; equatorial periphery lobate; axial periphery rounded; the last whorl consists of 5 globigerine chambers which increase rapidly in size as added; sutures straight, radial, depressed on both sides; umbilicus narrow, deep; primary aperture single, interiomarginal, umbilical-extraumbilical, with a narrow lip; supplementary sutural apertures found on the umbilical side only; surface covered with meridional costellae on both sides; wall calcareous, hyaline, perforate, except for the imperforate lip and surface rugosity.

**Remarks:** *A. shobairi* n. sp. is distinguished by its 5 inflated, rapidly increasing in size chambers, of the last whorl.

**Dimensions of holotype:** Maximum diameter (of the spiral side): 0.424 mm, minimum diameter (of the spiral side): 0.364 mm.

**Type Locality:** The holotype from site 364, Angola Basin, sample 27 - 2, top, southeastern Atlantic Ocean (CARON, 1978).

**Range:** Middle - Late Albian of Angola Basin, southeastern Atlantic Ocean (CARON, 1978).

**Depository:** The figured holotype is deposited in the Museum of Natural History, Basel, Switzerland, under the number C 33.786 (CARON, 1978).

**Derivation of name:** *Anania shobairi* n. sp., is named in honor of Prof. Dr Mohammed E. SHOBAIR, of the University of Gaza, in recognition of his efforts for supporting the scientific research in Gaza Strip, Palestine.

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