

# A CONTRIBUTION TO THE PATHOLOGY OF ANCIENT EGYPTIAN SKULLS

M. T. EL-RAKHAWY, H. I. EL-EISHI, A. EL-NOFELY and M. F. GABALLAH.

The study of the diseases which were prevalent among ancient populations is of particular importance to the study of man and his medical history. The available literature concerning Egyptian palaeopathology seems to be meagre. In spite of this paucity in the literature a good record of the pathological cases found among the ancient Egyptians was given by Elliot Smith and Dawson (1924) in their interesting monograph about Egyptian mummies. Wood Jones (1910) also gave a detailed account of the pathology found in the human remains excavated by the archaeological expedition of Nubia in 1907—1908.

Early studies concerning this subject showed a wide variety of pathological abnormalities. Traumatic fractures have been frequently met with particularly in the bones of the forearm. Osteitis, periosteitis, as well as inflammation of the soft tissues were also diagnosed. Specific types of bone infection such as tuberculosis and syphilis were suggested, though E. Smith denied the presence of syphilitic disease and claimed that these lesions were caused by the beetles of the graves. In a good number of cases most joints of the body were seen to be the site of rheumatoid affection; a condition described by W. Jones (1910) to be "par excellence the bone disease of ancient Egypt and Nubia". The majority of these latter conditions were complicated by osteoarthritic degeneration. Ruffer (1913) recorded a single case of osteoarthritis of the temporomandibular joint in a series of ancient Egyptian Christians (400—500 A.D.). The same author (1918) has also given a detailed study of the subject of arthritis deformans and spondylitis; he claimed that these affections were of the same frequency and nature through about 8000 years (from the predynastic till the coptic period) all over Egypt. Several cases of osteo-sarcomas, as well as two epitheliomas: one in the rectum involving the sacrum and the other in the nasopharynx involving the base of the skull were diagnosed by Smith in ancient Egyptian skeletons. Wells (1963) has also recorded a nasopharyngeal carcinoma in a male skull from the old kingdom.

The aim of this work is to further our knowledge about the subject of palaeopathology through the

study of a series of skulls from the early Christian period in Egypt (Circa, 500 ± 100 A.D.).

## MATERIAL

Two-hundred-and-twenty-two skulls were collected from a vast Coptic cemetery situated about one mile from El-Barsha village, on the east bank of the Nile, in Menya province, Upper Egypt. The material was transferred to the Department of Anatomy at Kasr el-Eini School of Medicine, where the skulls were numbered serially and subjected to a detailed anthropological investigation. Sexing was carried out by anatomical appreciation. Out of our 222 skulls, 140 were found males, 75 females while the remaining seven skulls were young and of uncertain sex. The age was determined according to the degree of closure of the main calvarial sutures, viz. coronal, sagittal and lambdoid, in addition to the extent of wear of the teeth. A skull is considered young (immature) when the spheno-occipital junction is not yet closed.

The adult skulls were taken at random but the few young specimens were especially selected for their pathological lesions.

## DESCRIPTION OF MATERIAL

Out of the whole cranial series examined, 45 skulls were found to show one or more types of pathological lesions; 37 of which were males, seven females, and one young. In this study, most of the diseases commonly met with nowadays were observed, viz. developmental deformities, traumatic fractures, inflammations, degenerations, benign and neoplastic lesions.

### Developmental deformities

A male skull of 40—50 years (skull No. 10) shows on its hard palate a number of perforations affecting both horizontal plates of the palatine bones. On the left side there are two oval perforations; the smaller (6×5 mm) is very close to the posterior nasal spine, while the larger (12×8 mm) is at the position of the greater palatine foramen. On the right side, most of the horizontal plate is

absent and two small foramina are present in the palatine process of the maxilla close to its posterior border. Furthermore, both vertical plates of the palatine bones are greatly affected. The edges of the perforations are very smooth with no signs of inflammation or erosion (Fig. 1). It, therefore, seems

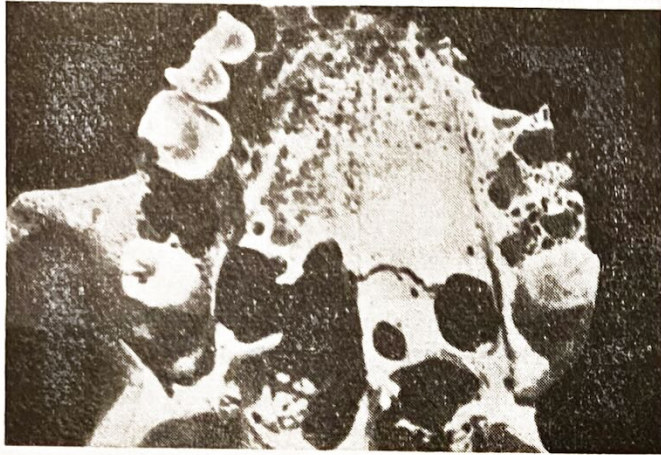


FIG. 1.  
Congenital perforation of the hard palate.

reasonable to assume that this condition may be the result of a certain mechanism of bone aplasia. From the elderly age of the specimen, the condition might possibly have exerted no deleterious effect on the general health of the individual.

No similar defects are seen in any other bone of the skull.

A different condition is observed in a middle-aged male skull (skull No. 192), where the first cervical vertebra is fused with the occipital bone (Fig. 2). The fusion affects both lateral masses of

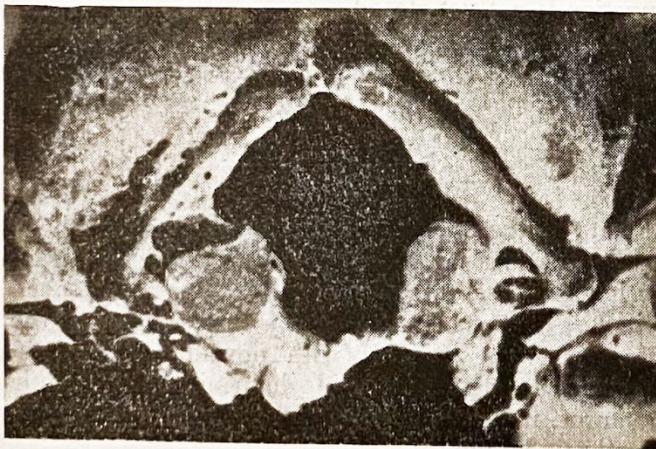


FIG. 2.  
Fusion of the atlas vertebra with the occipital bone.

the vertebra, the left transverse process and the left half of the posterior arch. The latter part is to a great extent absorbed in the occipital bone except at its root where a canal is left for the passage of the vertebral artery. In addition, the two halves of the neural arch fail to join at the middle line leaving a spina bifida. This condition may be of

developmental origin where the first cervical somite failed to separate completely from the occipital somites.

The third case belonging to this category of abnormalities is a typical case of hydrocephalus in a young (7 years) skull (skull No. 184; Fig. 3).

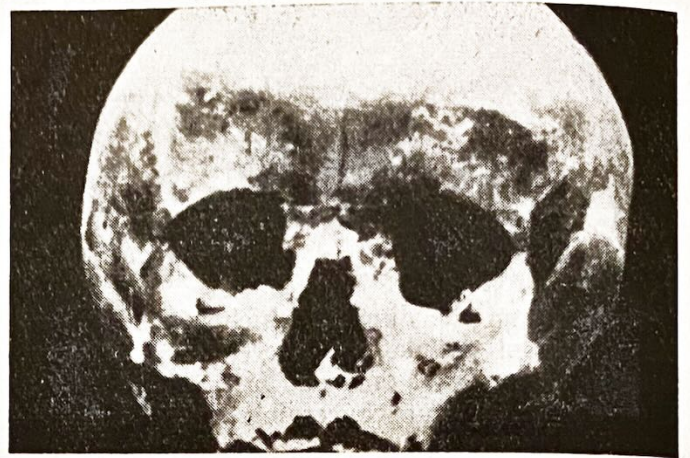


FIG. 3.  
Congenital hydrocephalus of a young skull.

### Traumatic fractures

Table (1) shows that 16 out of the 17 cases showing fractures are males. All these fractures are of the depressed type showing complete healing.

Most of the fractures are long, some of them reaching up to 50 mm. or more and their breadth varying from 8 to 20 mm. This prevalent shape of the traumatic lesions may point to the shape of the tool used. The fracture in skull No. 18 is extensive (60 mm long), its anterior part is still gapping, while



FIG. 4.  
A photograph showing a depressed fracture with its anterior part gapping.

its posterior end shows signs of healing (Fig. 4). In another case (skull No. 60), the fracture is so extensive that it distorts the medial margin of the orbit, the adjoining wall of the nose, and extends onto the left frontal air sinus where a gap is seen (Fig. 5). The anterior and the lateral regions of the

skull appear to be the most frequent sites of injury. It may be of some ethnic interest to notice that the occipital part of the head is not recorded to be a site for such trauma.

### Inflammatory lesions

Inflammatory lesions affecting the different bones of the skull are met with in eight middle-aged

is also seen affecting the lateral surface of the mandible (case No. 198) where the head of the mandible on the right side is the site of marked bone destruction probably due to a chronic process of inflammation. Skull No. 66 (male, 30—35 years) presents an area of excavation (9×6 mm) with an irregular outline and a friable floor in the outer table of the right side of the frontal bone close to

TAB. 1  
Distribution of the Fractured Bones of the Skull according to Sex and Age

Skull No.	Sex	Approximate age in years	Site of fracture
75	M	30—35	Frontal bone (18×8 mm)
68	M	About 60	Frontal bone (20×20 mm)
105	M	About 50	Frontal bone (9×8 mm)
138	M	30—40	Frontal bone
157	M	About 40	Frontal and parietal bones
60	M	40—50	Frontal bone nasal bones
2	M	> 60	Left parietal bone (56×16 mm)
222	M	30—40	Both parietals (Rt. two fractures, Lt. one)
18	M	About 40	Parietal and temporal bones
41	F	About 50	Left parietal bone (20×18 mm)
70	M	About 60	Left zygomatic arch
204	M	> 60	Left zygomatic arch
202	M	> 60	Right zygomatic arch
44	M	About 50	Right zygomatic arch
59	M	About 60	Nasal bones
65	M	50—60	Nasal bones
116	M	> 60	Nasal bones

males. Case No. 16 (male, 40—50 years) presents innumerable fine pittings in the posterior parts of both parietal bones and the interparietal part of the occipital bone; the surface of the affected part is not raised. This is probably a case of periosteitis. In skull No. 206 (male, about 50 years) innumer-

the coronal suture. In skull No. 85 (male, 30—40 years), the left greater wing of the sphenoid is the site of an inflammatory lesion with an irregular opening (5×5 mm) surrounded by a number of minute foramina (Fig. 6). This condition may be an implication of the bone from a lesion inside or

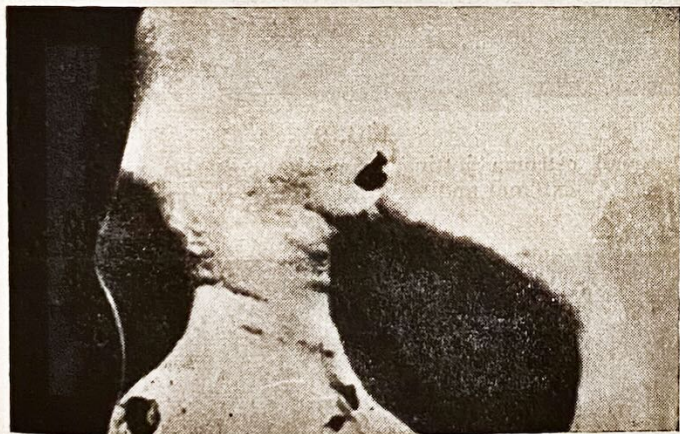


FIG. 5.

A photograph showing a depressed fracture involving the medial orbital margin and opening into the left frontal air sinus.



FIG. 6.

An inflammatory lesion in the greater wing of the sphenoid with an irregular opening surrounded by a number of minute foramina.

able vascular foramina are present in both parietal bones near the temporal lines, probably due to chronic infection. Skull No. 219 (male, 60 years), shows a slightly elevated circumscribed patch of osteitis in the right nasal bone. A similar condition

outside the skull. Skull No. 15 (male, 30—40 years) shows a deep cavity (13×8 mm) on its external surface. It lies on the lambdoid suture 8 mm to the left of the lambda (Fig. 7). As the floor of the cavity appears irregular, it is suspected to be a localised

## Degenerations

area of inflammatory degeneration, though gummatous degeneration or metastatic affection cannot be excluded. However, a typical case of mastoid abscess is noticed on the left side in the skull No. 56 (male, 35—40 years); the abscess cavity occupies the greater part of the mastoid process and opens on the surface by an irregular opening about 2.5 cm

Table (2) shows that males and females of middle and old ages are equally affected by osteoarthritic degeneration of the temporomandibular joint; the site more frequently affected is the articular eminence of the temporal bone.

TAB. 2  
Osteoarthritic Degeneration of the Articular Eminence  
of the Temporomandibular Joint

Skull No.	Sex	Approximate age in years	Side affected
27	F	30—40	Both sides, left greater than right
28	F	40—50	Both sides, left greater than right
195	F	about 60	Both sides, equally
56	M	35—40	Left Side
102	M	about 45	Left Side
123	M	> 60	Both sides, equally
198	M	20—25	Right side

above its tip (Fig. 8). By palpation through the foramen magnum, the petrous bone is found to be not involved.

Though both sides may show degeneration, yet the left appears to be more affected than the right, and in two cases only the left side is involved.



FIG. 7.

An inflammatory cavity on the lambdoid suture to the left of the lambda.



FIG. 9

A small osteoma jutting from the posterior wall of the external auditory meatus into its lumen.

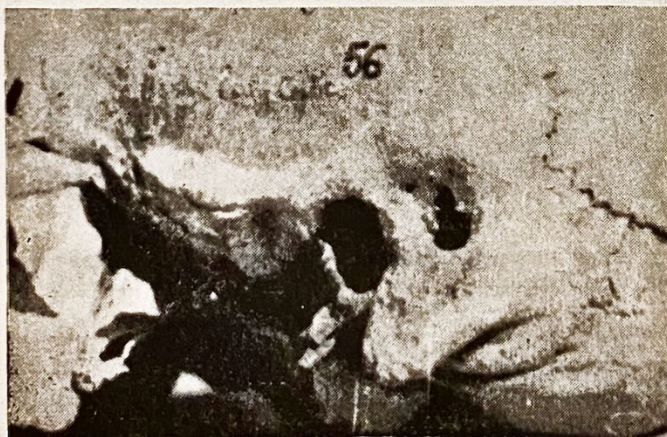


FIG. 8.

A photograph showing a mastoid abscess opening on the surface by an irregular opening.

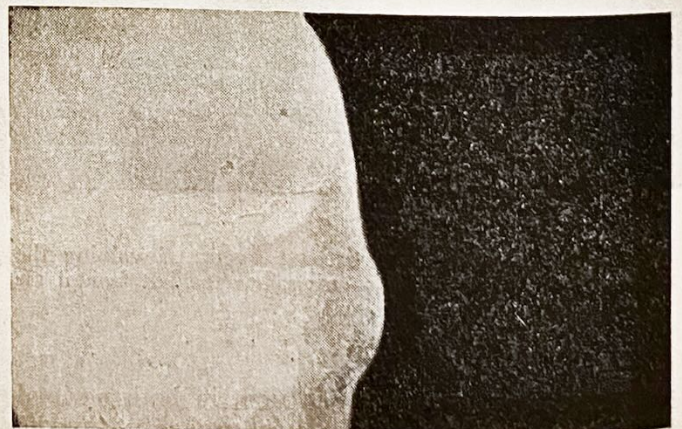


FIG. 10.

A medium-sized osteoma situated at the posterior inferior part of the right parietal bone.

However, in skull No. 198 (male, 20–25 years) the head of the mandible on the right side is the site of marked bone destruction; this is also associated with affection of the articular eminence. The findings in this case lead to the belief that it may be of pyogenic aetiology. In addition to affection of the temporomandibular joints, the articular surfaces of the joint between the second and the third cervical vertebrae on the right side show the same picture of osteoarthritis (skull No. 207; female, about 60 years).

### Benign tumours

Three cases of solitary exostosis are observed in skulls No. 44, 139 and 174. The first case (male, about 50 years) presents a small osteoma ( $6 \times 7$  mm) that juts forwards from the posterior wall of the external auditory meatus and partially fills its lumen (Fig. 9). Another small one is seen in skull No. 139 (female, more than 50 years) at the upper third of the left coronal suture. The last case, skull No. 174 (male, 30–35 years) has a medium-sized osteoma (20 mm in diameter) situated at the postero-inferior part of the right parietal bone (Fig. 10). Two cases are recorded to show tumour-like hypertrophy of the middle concha on the left side; the nasal septum in both skulls is deviated to the right



FIG. 11.

A photograph showing hypertrophied left middle concha of the nose.

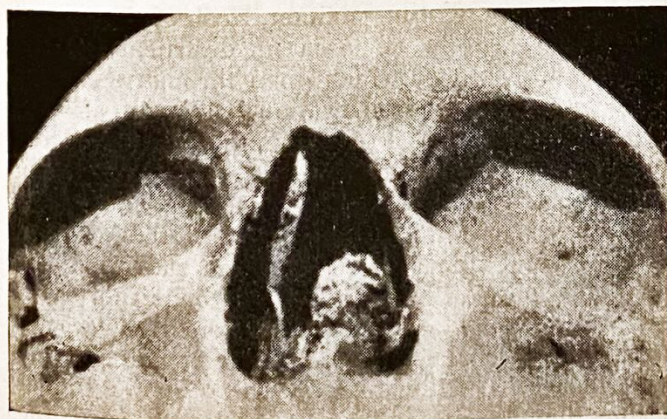


FIG. 12.

Another case of hypertrophied left middle concha of the nose.

side: skull No. 20 (female, more than 50 years; Fig. 11) and skull No. 84 (? male, 30–40 years; Fig. 12).

### Malignant lesions

Marked bone destruction, suggestive of malignancy, is noticed in two specimens. Skull No. 68 (male, 60 years) shows a deep eroded area ( $27 \times$



FIG. 13.

A photograph showing a deep eroded area involving the incisive region of the upper jaw; most probably a myeloid epulis.

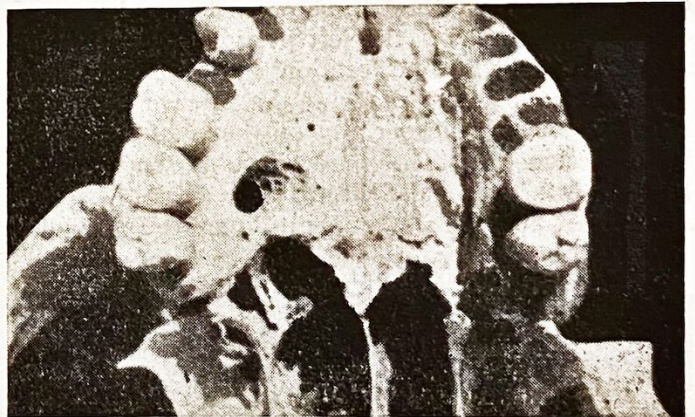


FIG. 14.

Bone destruction associated with chronic sepsis of the nasopharynx and encroaching on the hard palate; most probably a nasopharyngeal carcinoma.

$\times 15$  mm) involving the incisive region of the upper jaw (Fig. 13). The lesion destroyed the alveolar process at the left incisors and canine teeth and extended to involve the hard palate and the left maxilla, thus resulting in a communication between the oral and nasal cavities. This condition is most probably a cancerous lesion; possibly a myeloid epulis.

The second specimen, skull No. 58 (male, 30–35 years) is the site of bone destruction associated with signs of chronic sepsis (Fig. 14). The lesion affects mainly the right side of the nasopharynx where the floor of the right pterygoid fossa is opened into the maxillary sinus. Very close to the medial pterygoid plate another opening of nearly the same size ( $41 \times 6$  mm) is found between the maxillary sinus

and the right nasal passage. The horizontal plate of the palatine bone on the same side is nearly completely eaten up, while the remaining parts are the site of chronic inflammation. A groove is present on the inner surface of the posterior part of the right alveolar process that ends at the site of the first molar tooth by running into the maxillary sinus by a funnel-shaped opening. The erosion extends as well onto the left side where the posterior

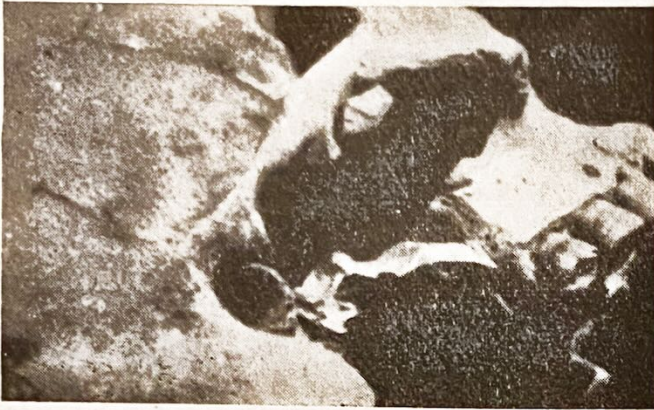


FIG. 15.

A photograph showing a piece of linen-thread in the external auditory meatus of the case in FIG. VI. 14, indicating referred pain to the ear.

border of the hard palate shows a lesser degree of erosion; the floor of the left pterygoid fossa is the site of a rounded perforation into the maxillary sinus. The posterior parts of the inferior turbinate bones of the nose especially on the right side show bone destruction. The basal part of the occipital bone is intact, and the nasal cavities are of normal size and shape. This case might have been produced



FIG. 16.

Osteo-vascular pitted patches on both parietal bones.

by a nasopharyngeal carcinoma which started on the right side of the nasopharynx. The right auditory meatus is found tightly packed up to the middle ear with a piece of linen cloth (Fig. 15); a finding that may indicate the severe pain referred to the ear from the nasopharyngeal lesion.

Among the series examined three interesting cases have been met with in skulls No. 182, 177

and 203, where a lesion is found to select the parietal bones and only in one case it also affects the orbital plates of the frontal bone. This lesion appears in the form of patches, the surfaces of which show fine pittings and narrow grooves among a complex network of fine ridges of bone. Skull No. 182 (Fig. 16), female, 16 years presents two well-defined patches upon the surface of each parietal bone, one anterior and the other posterior to the parietal eminence. On the left side the anterior patch (56×40 mm) is found continuous with the posterior (82×48mm), while on the right side they are separated (45×36 and 85×53 mm respectively). At the periphery of the lesion the pattern is less complex and a number of vascular foramina are seen coming out and grooving the surface of

#### PATHOLOGY OF ANCIENT SKULLS (500 A.D.)

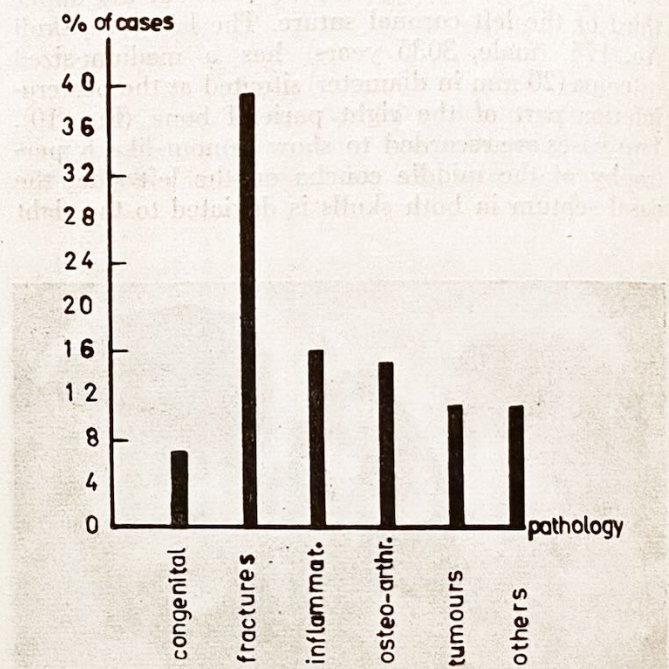


FIG. 17.

A histogram showing the distribution of the different pathological findings recorded among ancient Coptic skulls.

the skull in a radiating manner. Each of the posterior patches shows an area of destruction in its medial part, both of which open through the inner table by a narrow perforation, and the affected bone is noticed to be of a spongy nature. In the same skull, the roof of the orbit on both sides presents an early stage of a similar lesion. The frontal bone shows a number of foramina, from each of which several fine grooves are seen radiating. The different bones of the skull seem to be more vascular than usual as evidenced from the greater number of vascular foramina and grooves present.

Skull No. 177 (?male, 15 years) shows similar lesions, but the parietal bones are less affected; the lesion on the left side, however, is more prominent than that on the right side. The orbital roof is markedly involved on both sides. The last skull No.

203, that of an adult male (about 30 years), also shows the deformity as one patch in the left parietal bone, while both orbits are free.

### CONCLUSIONS

Forty-five skulls examined from the pathological point of view showed that both sexes and nearly all age groups were exposed to one or the other of the present-day diseases (Fig. 17, Table 3). The developmental abnormalities observed as perforations in the hard palate and fusion of the atlas vertebra with the occipital bone do not seem to have been recorded before in ancient Egyptian skulls. As far as our material is concerned, the most frequent lesions are traumatic depressed fractures.

(Goldstein, 1957). Malignant lesions, however, have been found to be confined to the oral cavity and the nasopharynx.

Lesions similar to those seen in skulls No. 177, 182 and 203 were described by Wood Jones (1910), but he did not give any explanation to their nature. However, he quoted Welcker's view which considered the lesion seen in the orbital roof (cribra orbitalia) to be due to an osteoporotic process. In our view, the condition appears to be due to vascular proliferation associated with new bone formation. This conclusion is justified from the extraordinary increase in the number of the vascular foramina on the surface of the skulls affected. Such assumed osteo-vascular patches may be of genetic origin, as they appear in a more or less typical pat-

TAB. 3  
The Frequency of the Different Pathological Findings in Ancient Copts

Developmental	Fractures	Inflammations	Osteoarthritis	Tumours	Others*	Total
N 3 % 6.67	17 37.78	8 17.78	7 15.56	5 11.11	5 11.11	45 100.01

\* This column includes also cases with hypertrophy of nasal concha.

The relatively small number of cases showing fractures among the 222 skulls collected indicates that these people were living a rather peaceful life. Sixteen out of the 17 cases are males, thus the females being the least exposed to such fractures. Most of the inflammatory lesions appear to be a complication of scalp injuries, though the localised excavation seen may be the result of syphilitic gumma. The condition of mastoid abscess recorded in this series has been previously described in other ancient Egyptian skulls by Smith (1924), who stated that "mastoid disease was very common in Egypt and in Nubia".

The probable aetiology of the osteoarthritic degeneration seen in the temporomandibular joint may be either a complication of rheumatoid arthritis (middle-aged cases), or it may be of gerontological nature as evident in the two senile cases. Only one young skull was seen to be affected by pyogenic arthritis of the joint. Though no post-cranial bones are available, yet this high percentage of eburnation of the temporomandibular joint and the similar affection of one of the joints of the upper cervical vertebrae lead to the belief that such degeneration was prevalent among ancient Egyptians. It is interesting to point to the fact that the left joint is more affected than the right; a finding that has been previously recorded by Smith (1924).

Two cases show hypertrophy of the middle concha of the nose; a record of four cases showing the same lesion were reported by Ruffer (1918) in ancient Egyptians.

In our series of skulls some osteomas are observed, one of them is found projecting in the external auditory meatus. The aetiology of ear exostosis has been suggested to be primarily of hereditary origin

tern being confined to the parietal bones, and in some cases associated with affection of the roof of the orbit. The left side appears to be involved earlier than the right.

### SUMMARY

Forty-five pathological skulls out of a total of 222 ancient Copts (500 A.D.) from El-Barsha were examined. The majority of them showed traumatic fractures and inflammations, but developmental deformities as well as osteoarthritic degeneration were also noticed. Benign as well as malignant lesions were also reported. Three cases showing patches assumed to be of osteo-vascular nature were discussed. From the distribution of the different pathological findings it was concluded that most of the diseases affecting modern man were also present among the ancient Egyptians.

### ACKNOWLEDGEMENTS

We are indebted to Professor A. A. Tarkhan, the former head of the Anatomy and Histology Department, Kasr el-Aini School of Medicine, for his supervision and continuous encouragement. Our acknowledgement is also due to Mr. Abdel-Rahman Abdel-Tawab and Mr. Assam Risk of the Egyptian Antiquity service for dating the material and for enabling Dr. M. F. Gabbalah to collect the material used in this study.

### REFERENCES

- GOLDSTEIN, M. S., 1957: Skeletal pathology of early Indians in Texas. *Amer. J. Physic. Anthropol.* Vol. 15, pp. 299-307.

RUFFER, M. A., 1913: Studies in palaeopathology in Egypt. *J. Pathol. and Bact.*, Vol. 18, pp. 149-160.  
RUFFER, M. A., 1918: Arthritis deformans and spondylitis in ancient Egypt. *J. Pathol. and Bact.*, vol. 22, pp. 152-196.  
SMITH, G. ELLIOT and DAWSON, W. R., 1924: Egyptian mummies. London, G. Allen.

JONES, F. WOOD and SMITH, G. ELLIOT, 1910: The archaeological survey of Nubia, 1907-1908. Cairo. vol. 2, *Report on the human remains.*  
WELLS, C. (Norwich), 1963: Ancient Egyptian pathology. *J. Laryngology and otology*, vol. 77 (3), pp. 261-265.  
M. T. EL-RAKHAWY, H. I. EL-EISHI, A. EL-NOFELY and M. F. GABALLAH, Dept. of Anatomy, Kasr el-Aini School of Medicine, Cairo University.