MALIGNANT DISEASE IN NATIVES OF NIGERIA: AN ANALYSIS OF FIVE HUNDRED TUMOURS*

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To obtain accurate figures when dealing with malignant disease among natives of the West Coast of Africa is difficult, and only a crude comparison of the types of neoplasm encountered can be hoped for. In many instances the specimens received for examination were unaccompanied by any clinical data. In many, however, the age, duration of lesion, site of tumour and clinical diagnosis were given. The age, in such people as we are here dealing with, is largely a matter of personal judgment, since no accurate birth records are available. The age of children up to 10 years can usually be estimated with fair accuracy, and in most instances where such young natives were under observation the age was definitely stated. The age of natives of from 10 to 20 (20 being taken as the age of an adult) is again relatively easy to estimate. Beyond this limit, unless the information can be gained from the patient and can be regarded as trustworthy, any estimation of age must be hazardous. The site of the tumour, when stated, constitutes accurate information, and in only 25 specimens was this important detail omitted. The determination of the duration of growth, since it depends for the most part upon the patient, is also open to gross error. The utmost care has been exercised in connection with the histological diagnosis of the neoplasms, and in all doubtful or unusual specimens a further opinion has been sought. It has been the general impression within recent times that the dark-skinned races are not so prone to contract malignant disease as those of lighter hue. Hoffman (1915), referring to Renner's appendix to the annual report on the medical department of the Colony of Sierra Leone for 1909 says: 'When every reasonable allowance is made for the want of accuracy and completeness in the available returns for the African continent, it would seem safe to assume that cancer is of a relatively very low degree of frequency in African countries, even among the white population of European origin, and that among the native population, as a general rule, malignant disease is extremely rare.' Fouché (1923) did not see a single case of cancer in a native during

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6½ years' residence among a population mainly composed of Basutos. A vegetarian diet has been suggested as a possible explanation of the supposed freedom of black races from cancer ; but, as Prentice (1923), speaking of Nyasaland, points out, the negro will eat all the meat he can get, whether still-warm prey or full of maggots, and he is only a vegetarian of necessity. He further states that the one circumstance ever present to the civilized man but absent from the philosophy of the negro, is worry. He tentatively suggests that if there be some negro-immunity from malignant disease this may be a factor. Civilization of the Africans, with the adoption by them of European customs, has been regarded by some as causing an increase in the cancer-rate among them ; but Adler and Cummings (1923) wisely remark that ' Europeanisation, whether or not it were conducive to the spread of malignant growths, would certainly be responsible for intelligent natives afflicted with them consulting medical officers. Thus civilisation may be wrongly blamed for the spread of the disease, when it is only responsible for its diagnosis.' The same authors quote Renner (1910) as having stated that cancerous and other malignant growths have been increasing among the Creoles of Sierra Leone, but that they were rare or absent in the aboriginal. They record the fact that the Fantis of the Gold Coast have been in contact with Europeans for centuries and that malignant growths are rare or absent among them, because they have resisted the inroads of civilization. Finally, they record seven cases of malignant disease, five of which occurred in aboriginees and two in Creoles. Sharp (1923), writing of Nigerian natives, states that carcinomas are rare, differing in this respect from sarcomas—this fact holding good even among the coastal towns of West Africa. Blair (1923) states that he never saw a case of carcinoma or sarcoma during his 22 years' sojourn in Nigeria. He further says that the occasional carcinomas found by medical men in the coastal regions occur chiefly in natives who have come into contact with Europeans. Macfie (1922), writing from the Gold Coast, is of the opinion that tumours are probably as common there as elsewhere, and that sarcomas appear to be rather more common.

If conclusions may be drawn from the small number of cases set forth in the present article, it would seem that there is no scarcity of malignant disease among Africans. The age incidence of certain types of tumours seems, moreover, to be earlier than among Europeans. It should be mentioned that the cases recorded are not collected entirely from the larger towns, such as Lagos, but have come from all over Nigeria, wherever a medical officer has penetrated. We venture to think that, as contact of medical officer with natives increases, so will their trust be gained, and as they gradually become weaned from their inherent beliefs in witchcraft and native medicine, they will consult the doctor more and more frequently, with a resulting increase in the number of malignant neoplasms recorded. Snijders and Straub (1924) in their paper on the cancer problem in the tropics aptly suggest that, instead of asking why malignant tumours are, in general, rare in the tropics, it would be more correct to question

why the site incidence of the malignant tumours is quite different from that in Europe.

With regard to sex, it would be useless to attempt any comparison between male and female as regards relative frequency of malignant disease, since even at the present time men attend hospital much more frequently than women. It is mainly due to the excellent propaganda work of the maternity and child-welfare centres that women are tending to make increasing use of medical aid. The opening up of roads and more rapid forms of communication between towns and outlying stations have helped to place the laboratory service more at the disposal of the medical officers, so that accurate diagnosis of specimens should become increasingly easy. The tumours analysed in this report represent the material received during the last eight years, and may be taken as a fair representation of the type of tumour met with in Nigeria, since they have emanated from all parts of that country.

An attempt has been made to classify the tumours, firstly, morphologically, and secondly, regionally, with a short note upon age incidence. The main types of neoplasm recorded are commented upon, as also are some of the more interesting cases. Tumours of the liver, maxilla and mandible, the long bones, salivary glands, female genitals, orbit, testis, brain and urinary bladder are discussed in greater detail.

An analysis of the tumours according to type is shown in Table A.

TABLE A

Type	No.	Percentage
Carcinoma	225	45·0
Sarcoma	220	44·0
Mixed parotid	18	3·6
Endothelioma	17	3·4
Adamantinoma	13	2·6
Cylindroma	2	0·4
Perithelioma	2	0·4
Teratoma	2	0·4
Chorionepithelioma ...	1	0·2
	500	

The carcinomas have been subdivided into :—

Type	No.	Percentage
Glandular	155	31·0
Squamous...	63	12·6
Basal-cell	7	1·4

The sarcomas have been subdivided as follows :—

Type	No.	Percentage
Round-cell	101	20·2
Spindle-cell	41	8·2
Melanotic	40	8·0
Kaposi tumour	10	2·0
Myosarcoma	9	1·8
Myeloid	9	1·8
Gliosarcoma	3	0·6
Mixed-cell	3	0·6
Osteosarcoma	3	0·6
Alveolar	1	0·2

No case of hypernephroma has been recorded.

From the above summary it becomes evident that the neoplasms are fairly evenly divided between the two main types of malignant disease. Had the melanotic sarcomas been classified separately as melanomas, the tumours of epithelial origin would have gained the ascendancy. In order that a rough idea of the regional distribution may be obtained, the following Table (Table B) is given :—

TABLE B

Site	No.	Percentage
Skin...	94	18·8
Lymph-glands	60	12·0
Liver	55	11·0
Bones	49	9·8
Female genitalia	34	6·8
Orbit	30	6·0
Parotid region	29	5·8
Breast	29	5·8
Limbs	23	4·6
Alimentary tract (excluding stomach)	11	2·2
Face...	8	1·6
Testis	8	1·6
Hand	7	1·4
Stomach, scalp and prostate, each	4	0·8
Mouth, pancreas, thyroid and axilla, each	3	0·6
Bladder, chest, palate, back and shoulder region, each ...	2	0·4
Gall-bladder, brain, lungs and tongue, each	1	0·2
Unspecified	25	5·0
	500	

Further investigation of the 94 skin tumours reveals the fact that by far the greater proportion (39) originated in the foot. The bone tumours are subdivided regionally as follows : maxilla or mandible, 28 ; long bones, 12 ; rib, 3 ; scapula, 2 ; skull and hand, 1 each ; unspecified, 2. No tumour of the pharynx and only one oesophageal growth is recorded. In consideration of the small number of cases under review it is idle to speculate as to possible reasons. Degorce (1914) comments upon the rarity of malignant tumours arising from these situations among the Annamites.

AGE

Twenty-nine, or 5·8 per cent., of the tumours examined occurred in children under ten years of age. Of these, no less than 10 were round-cell sarcomas of the orbit. Probably many of these growths had their origin in trauma, since injuries to the eye are notoriously common among natives. Included amongst these neoplasms is a round-cell sarcoma of the shoulder in a female child aged nine months ; an adenomyosarcoma of the kidney in an infant aged three ; two primary carcinomas of the liver in children aged four and six ; a lymphosarcoma of the mediastinum in a child aged three ; one of the abdomen in a child aged four ; and one of the axillary glands in a youth aged six. Further, this age group includes two sarcomas of the testis in boys aged six and seven respectively, and a round-cell sarcoma of the ovary in a girl aged eight. The next age group (10 to 30) includes 57 tumours. The number of eye tumours has diminished to 3, whereas tumours of the parotid now total 13. Eight tumours of the jaw are noted, as are also eight liver tumours and one chorionepithelioma of the uterus.

CARCINOMA

Squamous carcinoma

The number of these tumours recorded is 70 (including 7 basal-cell tumours). Of these, 33 originated in the superficial epithelium, including 8 carcinomas of the face and 3 basal-cell growths in the same region. Included also are 3 epitheliomas of the scalp, of the foot and of the female external genitals ; 5 ulcers of the limbs ; 2 of the penis and 1 of the scrotum ; and 2 tumours of the breast region. Both the latter were ulcerated growths, and in one part of the squamous epithelium showed histological changes suggestive of Paget's disease. In view of the supposed rarity of cutaneous epitheliomas in negroes, these figures are worth noting. Hopkins and van Studdiford (1934) state that ' Conversations with dermatologists who have clinics attended by Negroes in other cities have confirmed our belief that cancers of the skin rarely if ever occur in Negroes.' A tumour of the finger merits attention inasmuch as the history is suggestive of a possible occupational factor in connection with the aetiology of the condition. The following notes are derived from clinical

data supplied by Dr. Hope-Gill. The patient, a native of Northern Nigeria, aged fifty, had been an indigo-worker for many years. He had suffered from a vesicular rash on the hands from time to time, the eruption appearing in clusters and each attack lasting about three weeks. A year prior to examination the patient pricked one of the vesicles upon the end of his little finger. The minute lesion developed into an ulcer, and the surrounding tissues became infiltrated, the end-result being a large mass the size of a duck-egg. The mass was found to be hard, fungating and painless. In section, the growth was found to be a squamous cancer.

The squamous carcinoma of the oesophagus occurred in a male aged seventy. Histologically, there was well-marked ' pearl ' formation. Of the 155 adenocarcinomas, 48, or 30·96 per cent., had their origin in the liver. Next in frequency came tumours of the breast, to the number of 25. Six adenocarcinomas of the parotid region are recorded. Three of the breast tumours occurred in young male adults ; in two of them the histological appearance was that of an actively proliferating medullary carcinoma of low maturity. In one case, enlarged glands (axillary) were present, the enlargement being due to secondary deposits. The third case differed histologically from the other two in being cystic in type with papilliferous ingrowths, the degree of infiltration being slight. The remaining carcinomas of the breast, with one exception, occurred in adult female natives whose age, stated in only five instances, varied from 30 to 60 years. In the one case (reported by Dr. Davidson), the patient was a girl aged fifteen, who gave a long history of illness. The condition was symmetrical. In section, scanty isolated alveoli lined with cubical epithelium were present, surrounded by cells having large spherical or oval hyperchromatic nuclei with indistinct cell bodies. These cells tended generally to form sheets, but in many places attempts at alveolar formation were observed ; mitoses were numerous. It is difficult to know whether the tumour should have been interpreted as an anaplastic carcinoma or as an adenosarcoma.

SARCOMA

Melanotic sarcoma

Of the 40 melanotic sarcomas, 30 had their site of origin in the foot, suggesting a relationship to external injury. In 5, secondaries were present in the groin glands. In one case (Dr. Hunter's) secondaries were present in the ribs. The patient is stated to have come complaining of pain in the chest, and on examination a spontaneous fracture of the fifth rib occurred. At operation it was found to be the seat of a dark haemorrhagic-looking tumour mass. The sixth rib on the same side was similarly involved. Further examination revealed the presence of a fungating ulcer on the sole of the foot, which the patient claimed to have been present for eight years. The histological diagnosis was unquestionably melanotic sarcoma. None of these pigmented tumours occurred in young people, the average age lying between thirty-five and forty-five.

Morbid histology

These tumours presented a wide histological variation. In some, the structure was frankly spindle-celled throughout, the characteristic pigment being present within and around the tumour cells. A whorled arrangement of the cells was present in a few of the tumours, and a coalescence into dense partially-degenerate masses was of frequent occurrence. Many of the tumours presented areas composed of polygonal or spheroidal epithelial-like cells, having large sharply delineated vesicular nuclei and well-defined large nucleoli. In such areas the component cells were arranged in the form of compact alveoli or tubules. Pigment was frequently absent from these zones, but not invariably so. In a few of the tumours studied, the epithelial-like cells were arranged in closely packed masses so that, were it not for the presence of pigmented spindle-cells in the surrounding stroma, the appearance would have been similar to that of a medullary carcinoma. In two of the melanotic tumours the structure was akin to that of a squamous carcinoma of low maturity. The cells were large, irregularly polygonal with extreme variation in individual size, and were arranged in uneven masses and columns. Amitotic nuclear division, resulting in syncytial-like multinucleate masses, was a marked feature. The protoplasm of such aberrant cells was for the most part replete with the characteristic pigment granules, but small groups were present which were devoid of pigment. Vacuolation was marked in these cells. In two instances in which secondaries were examined this irregular epithelial-like cell formation was a noticeable feature, and here also the pigment was, in general, confined to the surrounding stroma. An appearance suggestive of perithelioma was noticed in one instance. Infiltration of the surrounding tissues was well marked in all the tumours seen. From the foregoing account one feels that perhaps it would have been more accurate to have classified these tumours under melanomas or even to have subdivided them into melanosarcoma and melanocarcinoma. The fact, however, that so great a degree of variation should exist in the same section, if not in the same low-power microscopic field, suggests that further subdivision is unnecessary. Kettle (1925) stresses the variability of melanotic tumours in general, and his descriptions are very similar to those recorded here. Ewing (1928) remarks upon the carcinomatous appearance of secondary melanotic tumours.

Myosarcoma

Included amongst this group of nine tumours is an interesting growth of the kidney in a female child aged three years. The patient, on examination by Dr. Hunter, was found to be emaciated and had a large swelling visible and palpable in the right side of the abdomen. An exploratory incision was made and a large tumour was found originating from the right kidney and almost filling the abdominal cavity. On removal it measured 12 inches by 10 inches by 9 inches. No record of weight was given. The child died 24 hours later. Examination of the portion of the tumour forwarded revealed the characteristic

structure of an embryonal kidney tumour similar to that portrayed by Ewing (1928). Closely-packed round or vesicular cells, with large granular nuclei and scanty cell bodies, formed the main ground-work of the tumour. Embedded in this tissue were numerous acinous-like structures, arranged singly or in groups, and composed of high columnar cells. Some of these pseudo-tubules contained a granular secretion. An occasional acinus showed papillary ingrowths into the lumen. Invasion of the kidney tissue was active and extensive. Permeating the ground-work of the neoplasm in an irregular manner were bundles of fibres having pale-staining, elongate, bluntly pointed nuclei. These fibres stained yellow with van Gieson's method, in distinction to the intense pink reaction of the stroma tissue proper. No striation was visible. The remaining tumours of this class include one myosarcoma arising from the rectus muscle, one from the shoulder region, one from the triceps, one from the suprascapular area and one from the testis, all occurring in male adults. The tumour from the suprascapular region was described by Dr. Wilson as being mushroom-shaped. The patient gave a history of injury with a stick two months previously. The growth presented a coarsely nodular surface and had invaded the skin, causing ulceration. The surface was very vascular and bled freely. No palpable glands were present. A somewhat striking microscopical picture was presented, particularly at the periphery, where the voluntary muscle fibres were irregularly arranged, finally becoming disintegrated into homogeneous masses of eosinophilic protoplasm containing one or several peripheral nuclei. Irregular mitoses and amitotic division figures were common, and resulted in rounded stellate or elongate hyperchromatic nuclear masses. Towards the centre of the tumour, masses of closely packed spindle- or ovoid-shaped cells were present, varying greatly both in size and in the degree of nuclear variation. Faint cross-striation was observed in some of the cells when stained by the Heidenheim method. They also stained well with van Gieson's method. The tumour was densely infiltrated throughout with polymorphonuclear cells, presumably as a result of sepsis following upon the superficial ulceration. The appearance in general closely resembled the illustration in Ewing (1928). The tumour of the testis was described by Dr. Henshaw as being hard and spherical. There was a history of six months' duration. On removal it was found to weigh 14 ozs. The structure varied, in the main simulating that of a fibrosarcoma, whilst here and there were regions composed of giant cells and irregular spindle and ovoid forms, similar to those described in connection with the suprascapular tumour.

Kaposi tumour (*multiple haemorrhagic sarcoma*)

Ten, or 2 per cent., of all the sarcomas belonged to the type known as multiple idiopathic pigment sarcoma. Macleod (1920) is of the opinion that Kaposi included at least two conditions in his description: (1) ' A malignant affection causing death by metastases '; (2) ' A much more benign condition affecting the extremities, especially the legs in men, in which the growths were

capable of disappearing spontaneously, did not give rise to metastases in neighbouring glands or internal organs and did not naturally interfere with the general health.' Macleod regards the latter as being possibly of angiomatous origin. The cases seen in Nigeria would seem to fall into this second group, though it is impossible to dogmatize, since the patients were not under observation for a sufficiently long period to rule out the possibility of secondary deposits developing. The patients were all males over thirty years of age, and the condition affected primarily the extensor aspect of the legs. In one of the cases the scrotum was also involved, and in another the extensor aspect of the hand showed commencing nodule formation. In appearance the nodules were initially discrete, varying in size from a pea to larger flattened masses. Their surfaces were smooth and the growths were soft in consistency, bleeding freely when incised. In the advanced cases the nodules were more numerous and coalescence occurred. Ulceration was present in two cases. The appearance is figured by Smith (1932) and by Ewing (1928), the latter giving an excellent example. In all of the cases seen, the lesions were symmetrical though not necessarily of equal intensity in both limbs. Histologically, the findings have been uniformly characteristic ; they were that of a spindle-cell sarcoma with numerous dilated blood vessels and showed a mild infiltration with plasma and round cells. Scattered haemorrhages were a feature of the microscopic picture. Mitoses were scanty but invariably present. Those affected did not seem to suffer from impaired general health, but in two instances pain and discomfort generally was brought on by prolonged standing or walking. Justus (1910) describes the experimental reproduction of the condition in white mice by subcutaneous inoculation of an emulsion of the sarcoma. Similar experiments made with the local variety of the tumour have been unsuccessful. Kaufmann (1922) notes the use of the term ' sarcoid ' in connection with this form of tumour as implying its intermediate position between granuloma and sarcoma, and remarks that the composition of the tumour, which is made up of round and more especially spindle-cells, favours the designation sarcoma.

There remain four examples of sarcoma which deserve mention. One, described by Elmes (1932), was an abdominal lymphosarcoma producing enormous increase in the size of the spleen from the results of prolonged obstruction of the splenic vessels.

The patient, a woman about 50 years of age, was first admitted to hospital with a history of abdominal pain for 1 year and, more recently, loss of weight and the appearance of a swelling in the left side of the abdomen. Laparotomy revealed the tumour as a greatly enlarged spleen extending down into the pelvis. No enlarged glands were noticed, and the abdomen was closed without further interference. Four months later the patient was re-admitted in an extremely emaciated and cachectic condition with considerable enlargement of the splenic tumour. Vaginal examination revealed an indurated mass filling up the pelvis, and there was pressure oedema of the left leg. Death took place 5 days after admission. At autopsy the abdomen was found to be occupied by the greatly enlarged spleen and masses of glands matted and fused together. The glandular tissue presented a white homogeneous appearance and was firm to the touch. It occurred in large masses in the pelvis and around the hilum of the spleen, and in more discrete nodules throughout

the abdomen. The stomach, intestines, spleen and pelvic organs, though partially fused with the neoplastic tissue, were not visibly infiltrated. The pancreas, on the other hand, showed extensive invasion. The spleen weighed 5½ lbs. Its cut surface was of deep purple colour, firm in consistency and with unduly prominent malpighian bodies. At the lower pole there was a large irregular infarct-like area. The splenic vein, involved in the tumour mass, was compressed and thrombosed. Microscopic sections of the neoplastic tissue showed the structure of lymphosarcoma of the reticulum-cell type. The histological appearance of the degenerate area in the spleen was that of an old infarct.

The second example, a primary sarcoma of the gall-bladder, has been recorded by Pearse (1929). The patient, a male, was aged approximately 30, and was admitted complaining of pain in the region of the liver. He stated that his illness had commenced as a colic and that later he noticed a swelling in the abdomen, most marked on the right side. There was no vomiting. On examination the patient was seen to be jaundiced, the abdominal muscles were tense, and the area of greatest rigidity and pain was slightly above that of McBurney's point. The liver was enlarged and very tender. The temperature was 99° F. An exploratory operation was made and malignant disease diagnosed. The patient died the same evening. At the post-mortem examination the liver, which was found to weigh 90 ozs., was yellowish-white in colour and had two small nodules embedded in its substance. The remaining organs, with the exception of the gall-bladder, were found to be normal. The gall-bladder was distended with bile-stained mucus and was rigid, resembling a miniature leather-bottle stomach in consistency. There were no calculi. The inner surface was rugose and deeply bile-stained. In cross-section, the wall of the bladder was thick, firm and of a dull white colour, sharply demarcated from the liver substance, except in the region of the bile-duct where it encroached upon the hepatic tissue in the form of a firm white outgrowth. In the adjacent lobe of the liver were the two white nodules referred to previously ; they were from 1 cm. to 1½ cm. in diameter. Histologically, the wall of the organ was found to be composed of large round cells, showing numerous mitoses and amitotic divisions ; nothing could be seen of the mucous membrane, beyond here and there a faintly stained papillary outline. The liver nodules were similar in structure.

A tumour of the testis in a boy aged 5 constitutes the third case of interest. The clinical history, supplied by Dr. Williams, stated that all the superficial glands were enlarged, the submaxillary being the most marked. The spleen was also greatly increased in size. There were flattened disc-like nodules present in the skin of the legs. The glandular enlargement improved under arsenic. The scrotal tumour, as received for examination in formalin, was found to be a spherical hard white mass about 6 cm. in diameter. In cross-section, the appearance was distinctive, a dark brown central area mottled over with white infiltrating nodular areas being displayed. The outer zone was composed of a dense white homogeneous layer. In section, the condition was regarded as being sarcomatous, probably of an embryonic type, but considerable doubt was felt as to the exact nature of the tumour, and we quote Colonel Harvey's report in detail : ' Sections show (*a*) A malignant melanoma. (*b*) Ill-staining cells and necrosis. (*c*) One, of several areas with pigment, which shows the pigment within tumour cells (melanoblasts) and not in simple phagocytic cells (melanophores). The difficulty lies in the ill-staining character of the tissue and the presence of pigment, some of which may even be blood pigment. I don't think there is any doubt that this is tumour. It might be seminoma and there are a few collections of lymphoid cells along with the tumour.' At Colonel Harvey's request, further portions of tissue were sent, on which he kindly reported again as follows : ' If it had not been for the previous specimen I doubt if I should have diagnosed the present specimen as such (i.e., melanoma). At the same time, with the help of the previous sections I would adhere to the diagnosis malignant melanoma instead of taking this to be—what I might otherwise have called it—an embryonal tumour of the testis.' Sections of one of the skin nodules showed the structure to be that of a dense spindle-celled sarcoma, with very occasional mitoses.

The fourth case was an abdominal sarcoma histologically resembling perithelioma. According to Dr. Morrison, the patient was a girl aged 5, and when first seen the abdomen was found to contain a tumour-mass reaching to the umbilicus. No pain was complained

of, but the child was emaciated and there was oedema of the legs. Six months later the child was again seen, when the tumour seemed to fill the abdomen, and at operation a mass weighing 7 lbs. was removed, the liver, right kidney and intestine being involved in the growth. The histological appearance of the portion sent for examination suggested sarcoma of a peritheliomatous type. The growth was composed of round cells clustered halo-wise around centrally placed thin-walled blood vessels. The intervening tissue showed degenerative changes. The appearance in general closely resembled that of a true perithelioma.

TUMOURS OF THE LIVER

Forty-eight of the recorded 55 tumours of the liver were carcinomas. Of these, 32 were undoubtedly of primary hepatic origin. This number, which is 6·4 per cent. of the present series, though a conservative estimate, seems to be exceptionally high in view of the statistics quoted by Ewing (1928) where 1·3 per cent. is regarded as being excessive. Cirrhosis was present in 17 of the primary carcinomas, being intensely marked in 10. In one case the cirrhosis was associated with schistosome infection, the fibrosis being definitely concentrated in the vicinity of the ova. In general, the cirrhosis assumed one of three types: firstly, a coarse variety in which the liver tissue was divided up into irregular lobules by broad fibrous bands, the organ presenting a 'hobnail' appearance; secondly, a type in which the cirrhotic areas were localized mainly to the region of the bile-ducts, the latter showing marked proliferative tendencies; thirdly, a group in which the fibrosis was almost pericellular in type, small groups of liver cells or even individual cells being completely cut off by the newly formed granulation tissue, the appearance in general being similar to that seen in a Hanot's cirrhosis. In this type, also, the bile-ducts were noticeably active. It is interesting to note that a high percentage of primary liver cancers (35 times as frequent as in Europe) has been noted amongst the natives of Bali (east coast of Sumatra) by Snijders and Straub (1922). The same authors comment upon the association of cancer with cirrhosis. In their experience the cirrhosis is nearly always of the Laennec type. Of 79 primary hepatic cell carcinomas seen by these authors, 67 were cirrhotic, and they conclude that there is a close connection between cirrhosis and primary cancer of the liver. In another paper the same authors give a percentage summary of tumours occurring among the Javanese, in which neoplasms of the liver figure as high as 55 per cent. In the present series the majority of the primary growths originated from the hepatic cells; in only two examples had the growth an unquestionable origin from bile-ducts. The ages were available in 21 of the cases: one, a boy, was aged four, another, a girl, was aged six, another, sex unstated, was aged thirteen, and two males were aged fifteen. Thirteen of the cases were under thirty years of age, two cases were aged thirty and one was aged thirty-five. In the case of the male child aged four, Dr. Ross stated that the duration of the condition was said to be two months. No history of trauma was elicited. The condition was regarded clinically as being suggestive of liver abscess, but at operation a large haematoma, partially organized, was discovered. Death occurred three hours

later. Microscopic examination showed alveoli, composed of columnar cells, lying amongst masses of round cells, irregularly arranged, the appearance on the whole resembling the description of an embryonic adenosarcoma of the kidney such as that described by Kaufmann (1922). In the second case alluded to—that of the female child aged six—no history was available. The histological appearance was that of an active primary malignant tumour, presenting a widely varying structure and accompanied by marked cirrhosis with proliferation of the bile-ducts. The remaining tumours of the liver present little of interest. Three round-cell sarcomas are noted (secondary), one primary round-cell sarcoma (assumed to be primary, since no other organ or tissue was found to be involved) in a boy aged fifteen, and two melanotic sarcomas.

TUMOURS OF THE MAXILLA AND MANDIBLE

Forty-nine tumours of bone are recorded, 28 being situated in the region of the mouth. Of these, 9 occurred in the mandible, 7 in the maxilla, and the sites of the remainder were unspecified. They can be subdivided according to type as follows : adamantinoma, 13 (6 in the mandible, 3 in the maxilla and 4 in the ' region of the jaw ') ; sarcoma, 12 ; carcinoma, 3. Adamantinoma would appear to be a relatively common variety of tumour in the Nigerian native and frequently to reach a great size. Le Dantec (1922) describes four cases very similar in type to those seen in Nigeria. He regards them as mixed tumours of dental origin and comments upon the complete absence of recurrence. Histologically, these growths are characteristic, being composed of masses and strands of spindle-shaped cells, having an external limiting layer of high columnar cells (epithelial odontome of Kettle, 1925). Cystic degeneration of the cell masses was frequently observed, the appearance being then identical with that portrayed by MacCallum (1931). In one instance, in which the patient was a young male adult, the tumour was the size of a tennis ball and had ulcerated through the hard palate. A history of six months' duration was given (clinical notes supplied by Dr. Hunter). Microscopically, this tumour, though presenting characteristic areas, was mostly composed of groups of actively proliferating, flattened, spindle-shaped columnar or polygonal cells, packed closely together and having intense staining nuclei with numerous mitoses. Infiltration of the surrounding tissues was marked, and the appearance in general was comparable to the ' epidermoid carcinoma type ' described by Ewing (1928). In another case, that of a female aged twenty-seven, recorded by Dr. Gibson, the tumour caused a protrusion of the upper lip to a considerable extent, and a history of three years' duration was obtained. This tumour was definitely encapsulated. In section it was typical, being composed of dense masses of cells, having a marked tendency to papillomatous formation (possibly due to the restraining influence of the capsule). Mitoses were numerous. The earliest recorded age for adamantinoma was that of a boy aged fifteen years,

all the remainder occurring in adults. Included in the tumours of the mandibular and maxillary regions are three round-cell sarcomas occurring in boys with ages varying from ten to twelve, two myeloid sarcomas in boys aged ten and twelve respectively, a carcinoma in a boy aged ten, and an atypical form of sarcoma in an adult resembling Selby's case (previously described under sarcoma) in histological structure, but being more active in nature and presenting numerous mitoses.

TUMOURS OF THE LONG BONES

These include three round-cell sarcomas of the head of the humerus, two myeloid sarcomas of the head of the radius, a round-cell sarcoma, a spindle-cell sarcoma and a squamous carcinoma of the tibia. This latter occurred in a male aged forty-five. He was admitted with an extensive ulcer of the leg, which had a hard irregular edge and a deeply excavated base. On further examination it was found that the tibia had become honey-combed in the region of the ulcer base and was riddled with discharging sinuses. Histologically, the growth was a typical squamous carcinoma with well-marked pearl formation, and had obviously originated in the skin. One round-cell sarcoma is recorded of the lower end of the femur in a female aged twenty, of which case Dr. Sybil Batley has provided the following notes :---When admitted, the patient complained of a painful swelling of the knee and gave a history of four months' duration. She was emaciated and exhibited a hectic temperature. On examination, a fracture of the lower end of the femur was found associated with a haemorrhagic mass extending into the joint cavity. Tumours of other bones (seven in number) include a round-cell sarcoma of the metacarpal bones of the hand in a male child (exact age unspecified).

TUMOURS OF THE FEMALE GENITALS

The 34 tumours of this region comprise 21 cervical, 4 ovarian, 4 uterine, 2 vaginal, 2 labial and 1 vulvar growth. All were carcinomas, with the exception of four, i.e., a teratoma and a round-cell sarcoma of the ovary, a myosarcoma, and a chorionepithelioma of the uterus. The latter occurred in a woman aged thirty, with a history of one previous pregnancy. When seen, she had had amenorrhoea for 13 months, had felt foetal movements at one time, but these were alleged to have ceased four months before admission. She was very emaciated. On an exploratory operation being made, a large irregular mass was found filling the abdomen. It was connected with a smaller mass in the pelvis about the size of a five-months' pregnancy. A macerated foetus (8 months) was found free in the abdominal cavity. Two weeks later the patient developed chest symptoms, had severe haemoptysis and died. The sputum was negative for acid-fast bacilli. Autopsy was not permitted. (Notes supplied by Dr. Sybil Batley.) Sections of the pelvic mass revealed the presence of

numerous chorionic villi, with irregular proliferation of the syncytial cell-masses. This finding, taken in conjunction with the clinical history, seems to leave little doubt as to the diagnosis.

TUMOURS OF THE SALIVARY GLANDS

Under this heading are included all the pure malignant tumours of the salivary glands and all mixed tumours of the salivary-gland type ; of the latter, 18 examples are recorded, 15 from the parotid region, one from the submaxillary, one from the upper lip and one from the palate. The majority were from young individuals, the youngest recorded age being fourteen and the oldest fifty. In the accompanying clinical notes the sex was mentioned in 15 of the cases, of which 7 were females. The histological structure of these mixed tumours conformed to the text-book descriptions. Cartilaginous tissue was present in 5, and from a study of these one is inclined to trace its origin to condensed myxomatous tissue—a view held by Kettle (1925) who considers that where true cartilage is present the tumours belong to a different group, i.e., the teratomata. The epithelial nature of these mixed tumours is now almost generally accepted, but there are still some who favour an endothelial origin, and others again who regard them as belonging to the teratomas. Neither of the latter views receives support from the histological study of the present series. The pure malignant tumours were all situated in the parotid region and include four adenocarcinomas and two round-cell sarcomas. Three of the adenocarcinomas occurred in males about fourteen years of age ; in the fourth the age was not recorded. The histogenesis of the round-cell tumours could not be determined. They were composed of spherical cells, showing in places a distinct alveolar arrangement, and might be classified as round-cell sarcomas or as round-cell carcinomas. According to Ewing (1928), salivary-gland tumours of this type are more likely to belong to the latter. One occurred in a girl aged fifteen years, and the other in an adult. In the clinical history of the former case (Selby, 1928), it is stated that the growth apparently originated in the parotid gland of the left side, and when first seen was almost equal in size to the patient's head. The mass had extended backwards, downwards and forwards, causing a displacement of the ear, the nose and the lips. It had completely encircled the jaw, but the mouth was not involved. The surface of the tumour was extensively ulcerated from the application of native medicines. One small gland was palpable above the left clavicle, probably the result of sepsis.

A history of three years' duration was given. The child appeared to be in good condition as regards general health. The subsequent history is not known.

TUMOURS OF THE ORBIT

The orbital tumours comprise 18 sarcomas (with the exception of one melanotic growth, they were all round-cell in type), 10 carcinomas, one endothelioma and one cylindroma. Attention has already been drawn to the early age

incidence of these eye tumours ; one occurred in a boy aged three, another in a boy aged four, and a third in a girl aged five. Two occurred in boys aged six, and in five further cases the ages lay between eight and ten. The age was not stated in the case of twelve of the tumours received. The boy aged three was seen by Dr. Davidson, who found that the tumour-mass completely filled the orbital cavity, with resulting proptosis and destruction of the cornea and iris. A history of two weeks' duration was given. The cylindroma occurred in a male aged nineteen, and when seen by Dr. Macaulay the growth was causing protrusion of both eyelids, the eye itself being totally disorganized. The duration of the condition was said to have been a year. Histologically, the neoplasm was a perfect example of cylindroma.

TUMOURS OF THE TESTIS

Of the 8 testicular tumours recorded, 6 were sarcomas and one was an adenocarcinoma. One of the former has already been described in dealing with the myosarcomas. Of the remaining 5, 2 were spindle-celled sarcomas occurring in adults, 2 were round-cell sarcomas occurring in boys aged seven and thirteen, and one was a teratoma. The remaining case was a fibrosarcoma, probably a melanoma, which occurred in a boy aged six. It has been described under the melanotic sarcomas.

TUMOURS OF THE URINARY BLADDER

One tumour only of the bladder is noted, a solid carcinoma. No evidence of schistosome infection was present in this case. Signs of infection with *Bilharzia haematobium* are commonly met with at post-mortem examination, though no clinical symptoms may have been manifest. Histological examination of the mucous membrane usually reveals a characteristic reaction. The component cells are in a state of active proliferation (frequent mitoses) and are atypically arranged, with solid plugs of epithelium extending into the submucous layer. Some of these plugs have an external layer of high columnar cells and may even be entirely composed of such cells. These latter may have their origin in the mucous glands said to be common near the base of the bladder in man (Schäfer, 1916). The appearance is highly suggestive of pre-malignant changes, and it is to be wondered at that the condition does not go on more frequently to true neoplastic growth.

SUMMARY

Five hundred malignant tumours, obtained from all parts of Nigeria, have been analysed as accurately as was possible from the information available. The results so obtained have been detailed, partly in the form of Tables and partly as a series of notes dealing with the morphological and regional distribution of the neoplasms. The melanotic sarcomas, the adamantinomas and the sarcoma of Kaposi are commented upon in some detail. Due regard has been paid throughout to age incidence and to sex.

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