CEYLON J. MED. SCI. (D) VOL. VII, PT. II, (June, 1950).

Glandular Tumours of the Oral, Nasal and Orbital Cavities

BY

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A comprehensive study of tumours arising from the glands in connection with the mouth, nose and orbit has not so far been made although there are many references in the literature to a group of neoplasms known as the 'mixed salivary gland tumours' (Fry, 1927 ; Patey, 1930 ; Davis, 1935 ; Eggers, 1938 ; Sheldon, 1943 ; Hellwig, 1945). Although a large number of tumours arising in these situations belong to the above category, there are several others which show marked differences both in their morphological features and mode of origin. An attempt is made in this paper to deal comprehensively with all varieties of tumours arising from the parotid, submaxillary, sublingual and lacrymal glands and also from the smaller mucous glands of the mouth and nose. The study is based on consecutive biopsy specimens from these regions, examined in the Department of Pathology, University of Ceylon during the period 1936 to 1949. During these 14 years, 178 tumours arising primarily in these sites, have been examined and as a large number viz. 123 or 69% arose from the parotid gland, these have been studied as a separate group ('Parotid tumours'), the remainder being called 'extra parotid tumours'.

In both these groups the neoplasms showed certain well defined features by means of which it was possible to identify these as one of the following (1) so-called 'mixed tumour type' (2) adenolymphoma (3) muco-epidermoid tumour (4) carcinoma (5) adenoma. The 'mixed tumour type' ('mixed salivary gland tumour') is a well recognised histological type (*vide supra*) and any tumour composed of a stroma of mucoid connective tissue, often undergoing cartilaginous transformation with groups of epithelial cells either glandular or squamous was considered to belong to this category. The adenolymphoma and the muco-epidermoid tumour were also distinctive types, the former characterised by the presence of adeno-papillary formations in a lymphoid stroma and the latter by the presence of an admixture of mucus secreting epithelium and cells showing epidermoid features (Stewart et al 1945). The terms carcinoma and adenoma are self explanatory. A distinct variant of the latter type was the bronchial adenoma with a histology identical with that of the innocent tumours arising from the bronchial epithelium (Willis, 1948).

Table 1 shows the tumours in both groups classified according to these criteria and Table 2 the different sites as well as the histological types of the 'extra parotid tumours' Table 3 gives the percentage incidence of all the tumours at various sites.

TABLE I

	Parotid Group	Extra Parotid Group	Total	Percentage
Mixed parotid tumour	97	42	139	78
Adenolymphoma	2	1	3	2
Muco-epidermoid tumour	9	3	12	7
Carcinoma	8	3	11	6
Adenoma	7	5	12	7
Unclassified	—	1	1	—
Total	123	55	178	—

TABLE II

Site	Mixed Parotid Tumour	Adeno-lymphoma	Muco-epi-dermoid Tumour	Carcinoma	Adenoma	Unclassified	Total
Submaxillary	17	1	1	2	1*	–	22
Sublingual	3	–	1	–	–	1	5
Tongue	1	–	–	–	–	–	1
Palate	9	–	–	–	–	–	9
Lip	3	–	–	–	–	–	3
Cheek	2	–	1	–	1	–	4
Lacrymal	4	–	–	–	–	–	4
Nose	2	–	–	1	3*	–	6
Unknown	1	–	–	–	–	–	1
Total	42	1	3	3	5	1	55

*Bronchial Adenoma Type.

TABLE III

Total Number of Tumours 178

Site	Number	Percentage
Parotid Gland	123	69
Submaxillary Gland	22	12
Sublingual Gland	5	3
Glands of Tongue	1	1
Palatal Glands	9	5
Labial Glands	3	1
Buccal Glands	4	2
Lacrymal Glands	4	2
Nose	6	3
Unknown	1	1

The most prevalent histological type in both the parotid and extra parotid groups was the 'mixed' salivary gland tumour, its incidence being 79% and 76% respectively in the two groups. Although the other types were much less prevalent they were represented in both groups. The bronchial adenoma was most frequently met with in the nose.

In the extra parotid group 27 of the 55 (49%) arose in the submaxillary and sublingual salivary glands, 9 (16%) in the palatal glands, 4 (7%) in the buccal glands, 3 (6%) in the labial glands. Thus 82% of the tumours in this group arose in glands draining into the mouth and if the 123 tumours of the parotid gland are also included, a very large number viz. 93% is seen to arise from glands opening into the oral cavity. However 10 such tumours or 6% of the total arose in sites unconnected with the mouth viz. the lacrymal glands and the mucous glands of the nose. All the 4 lacrymal neoplasms and 2 of the nasal tumours were of the 'mixed' salivary gland type.

Age incidence. Table 4 gives the age distribution in the two groups.

TABLE IV

Age Group	*Parotid Group*	*Extra Parotid Group*	*Total*
1—10	—	1	1
11—20	18	9	27
21—30	32	8	40
31—40	29	13	42
41—50	18	9	27
51—60	8	7	15
61—70	4	3	7
Age unknown	14	5	19
Total	123	55	178

Tumours occurred at all ages in both groups, the largest number viz. 82 out of 178 or 46% being found in the 3rd and 4th decades. In the parotid gland the largest number of cases occurred between 21 and 30 years and in other sites a decade later. Four out of the 8 cases of parotid carcinomas, occurred at a comparatively young age, viz. 15, 30, 23 and 24 years respectively—(A previous study of 2,295 malignant tumours by one of us (Cooray 1944) has shown that the 'cancer age' for this country is between 45 and 54 years). Of the 3 carcinomas in the extra parotid group one was noticed at an extremely young age viz. 13 years and the remaining two at 40 and 42 years respectively. The adenomata were most frequently met with in younger persons below 30 years excepting the bronchial adenoma which appeared at a later period of life. Muco-epidermoid tumours were seen in the young as well as in the old.

TABLE V

Sex	*Parotid Group*	*Extra Parotid Group*	*Total*
Males	63	19	82
Females	56	35	91
Sex unknown	4	1	5
Total	123	55	178

There does not appear to be any significant differences in the sex incidence in the parotid group or when both groups are considered collectively. However tumour formation in sites other than the parotid gland appears to be more common in the case of females.

TABLE VI

Racial Incidence

Race	*Parotid Group Number*	%	*Extra Parotid Group Number*	%
Sinhalese	89	72	37	67
Tamils	24	20	6	11
Moors	5	4	5	9
Burghers	1	1	5	9
Europeans	1	1	1	2
Race unknown	3	2	1	2

As the Sinhalese form the majority in the local population a high incidence of tumours of both groups in this race is not unexpected. However the incidence of extra parotid tumours in the burgher population appears to be very high.

Histology

All the histological types (Tables 1 and 2) were represented in tumours arising in the parotid as well as the other glands in connection with the mouth orbital and nasal cavities excepting the 'bronchial adenoma' type which occurred only in the nose and submaxillary salivary gland. The most prevalent histological type at all sites excepting the nose was the so-called 'mixed' salivary gland tumour (vide Tables 1 and 2). Even this type showed considerable variation in structure giving rise to several histological variants. We adopted the criteria advocated by Patey, (loc cit) in the recognition of the 'typical' mixed tumour viz. the presence of (1) collections of cells without definite arrangement (2) adenomatous areas (3) myxomatous areas (Fig. 1). Variations in the glandular and stromal components as well as metaplastic and degenerative changes caused considerable deviation from this 'typical' appearance and gave rise to several histological variants. Sometimes the stroma was very scanty, the tumour being extremely cellular with little or no tendency to form glandular lumina. The cells too were markedly anaplastic bearing little or no resemblance to acinar or ductular epithelium. Such solid tumours with round or spindle shaped cells simulated sarcomata in appearance

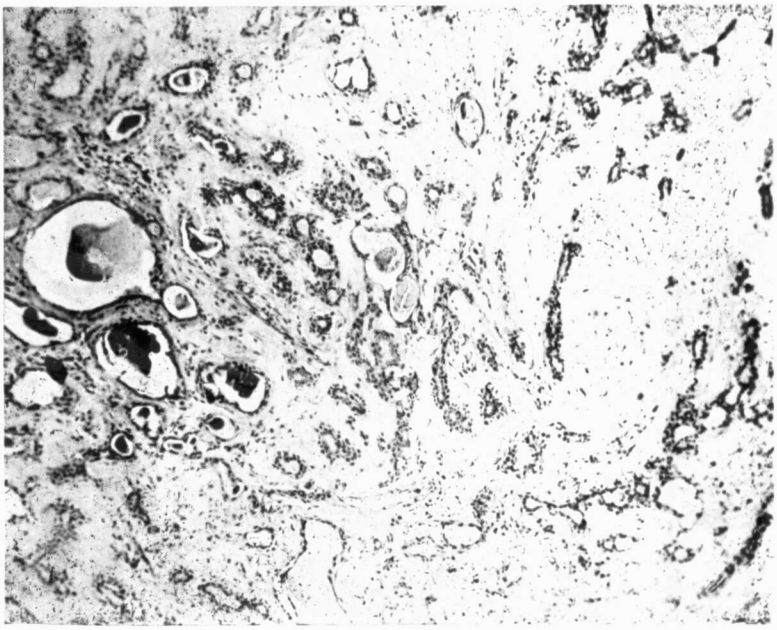

Fig. 1

Appearance of a 'typical' mixed tumour

H & E × 80

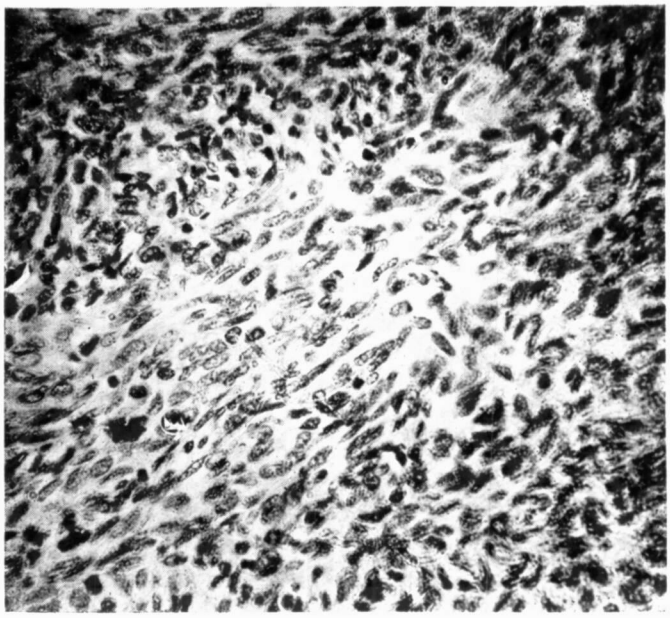

Fig 2

Solid tumour showing a spindle-celled sarcoma like structure

H & E × 190

(Fig. 2) but a more thorough examination revealed rudimentary tubule formation (Fig. 3). Although these tumours were very cellular only occasional mitoses were seen and evidence of functional activity e.g. secretion of mucin, was entirely absent. This variety represented the most undifferentiated type of mixed parotid tumour. On the other hand there were tumours with but a few epithelial cells arranged in small scattered groups with a marked preponderance of myxomatous stroma which in places had undergone pseudocartilaginous transformation (Fig. 4). Between these two extremes the 'mixed' tumour type presented all gradations in structure. In the differentiated variety there were acinar and duct-like structures which closely resembled those of normal salivary tissue, the only difference being proliferation of the lining cells. Metaplastic changes in the epithelium contributed to the development of epidermoid characters. Thus the epithelial component of the tumour took the form of squamous cell growths. Further differentiation led to the formation of cell nests (Fig. 5).

The growth of the epithelium in anastamosing trabeculae gave rise to an alveolar appearance (Fig. 6) and in certain types the stroma had undergone mucoid degeneration forming cylinders of mucoid material surrounded by epithelial cells—the so called cylindroma (Fig. 7).

Different degrees of functional activity also contributed to histological variation Mucin elaborated by the epithelium often formed blebs within epithelial masses. An extreme degree of functional activity with marked metaplasia resulted in the formation of a distinct histological pattern—the muco-epidermoid tumour (Fig. 8) which bore no resemblance to the mixed parotid tumour. Twelve such tumours, which have been regarded as a distinct histological type, occurred in this series. All arose in the salivary glands.

Twelve neoplasms which were uniform in structure have also been regarded as a separate histological type distinct from the 'mixed' tumour type. These were either solid consisting of groups of alveoli filled with cells (Fig. 9) or papillary composed of papilliform processes projecting into a cyst. A variant of this type which most frequently occurred in the nose was the bronchial adenoma (Fig. 10) showing histological features characteristic of the innocent tumours arising from bronchial epithelium (Willis, loc cit).

A tumour which was highly distinctive and not related to any of these types with a characteristic appearance of adeno-papillary formations in a lymphoid stroma was the adenolymphoma (Fig. 11). Only 3 such tumours (or 2%) were encountered in this series.

There were 11 carcinomata arising in the parotid and extra parotid sites, its incidence being 6%. Seven per cent. of the tumours arising in the parotid gland and 5% in the remaining sites were carcinomatous. Evidence that the carcinoma arose in a previous mixed parotid tumour was lacking excepting in two cases. The histological appearance was not different from other carcinomata of glandular origin (Figs. 12 and 13). In one instance only was there evidence of infiltration of the adjacent muscle (Fig. 14). It is of interest to note that 4 out of the 11 carcinomata occurred below the age of 30 years.

Discussion

The tumours that we have described fall into a distinct category. Although they arose in different sites, their common progenitor was the glands which drain into the orifices of the facial region. Ninety-three per cent. arose from the main salivary glands (viz. the parotid, submaxillary and sublingual) and from the smaller glands which are widely distributed around the oral cavity. Such tumours are not common. Schreiner and Maltick (1929) in an analysis of 6,695 patients found an incidence of 1 per cent. Billroth (1859) found 40 tumours of the salivary glands among 2,058 cancers or 1·94 per cent., Ahlbom (1935) of Radiumhemmet which attracts tumour patients from all over Sweden reported a series of 254 tumours of the salivary glands covering a period of 20 years i.e. about 12 tumours a year. The incidence of such tumours in Ceylon does not appear to be different. Our records show that its incidence is approximately 2 per cent. of all tumours examined in the laboratory and according to the present study about 12 such tumours are seen per year. Nearly half the tumours in our series appeared during third and fourth decades, a finding which is in agreement with the age of onset of similar tumours in other peoples (e.g. McFarland 1926 ; Stein and Geschickter 1934, Willis, loc cit).

Regarding the sex incidence Willis (loc cit) states that there is only a slight difference between the sexes in their liability to salivary tumours but that many of the recorded series show a predominance of females. The present series does not show much disparity in the sex incidence in tumours of the parotid gland but tumours in other situations occurred nearly twice as frequently in females.

In the present series 69% of the tumours arose from the parotid gland—a finding which is in agreement with that of other workers who have noted a preference of these tumours for the parotid gland. (Patey, Hellwig, Willis ; loc cit). A comparison with Willis' (loc cit) analysis of 358 tumours reported by different authors reveals minor descrepancies. Our series shows a slightly larger proportion of tumours arising in the submaxillary, sublingual and palatal glands. Although Willis (loc cit) states that lacrymal tumours often show a close structural resemblance to salivary tumours, neither he nor any others make special mention of the lacrymal gland as a site of origin of this class of neoplasms. In our series all the 4 lacrymal tumours were of the mixed tumour type (Fig. 1).

The nose is rarely mentioned as one of the sites of origin and indeed Willis (loc cit) is of the opinion that cases described as ' salivary tumours ' occurring in the nose are in actual fact adamantinomas involving the antrum, parts of which bear a close resemblance to salivary tumours. In our series two of the 6 nasal tumours were definitely of the mixed tumour type (Fig. 1) and in no portion of the tumour could we elicit any evidence of an adamantinomatous origin.

The multiplicity of names used by different authors to designate these neoplasms is sufficient evidence that no agreed conclusions have been reached regarding the histological classification of these tumours. Our classification into five main groups (vide Tables 1 and 2) has been based entirely on definite histological criteria (vide supra) and we experienced no difficulty in placing these tumours in one or other group. Confusion is bound to arise in the case of one such group viz. the ' mixed tumour type ', owing to the marked pleomorphism displayed by these tumours on

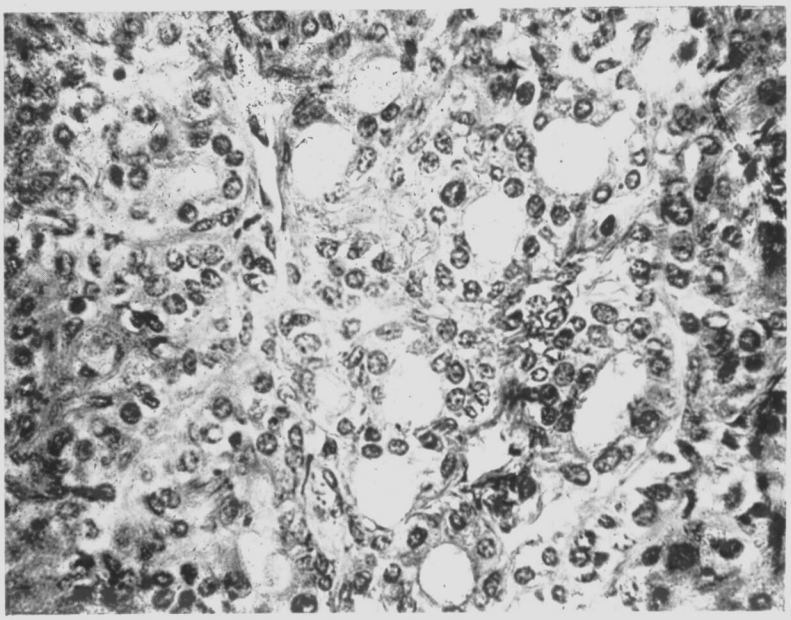

Fig. 3
Rudimentary tubule formation in a solid tumour
H & E × 190

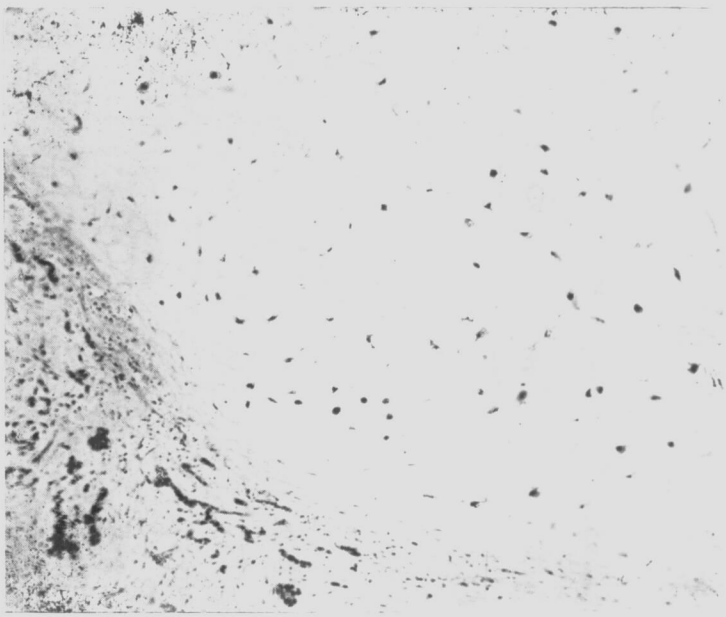

Fig. 4
Pseudocartilagenous transformation of myxomatous stroma
H & E × 80

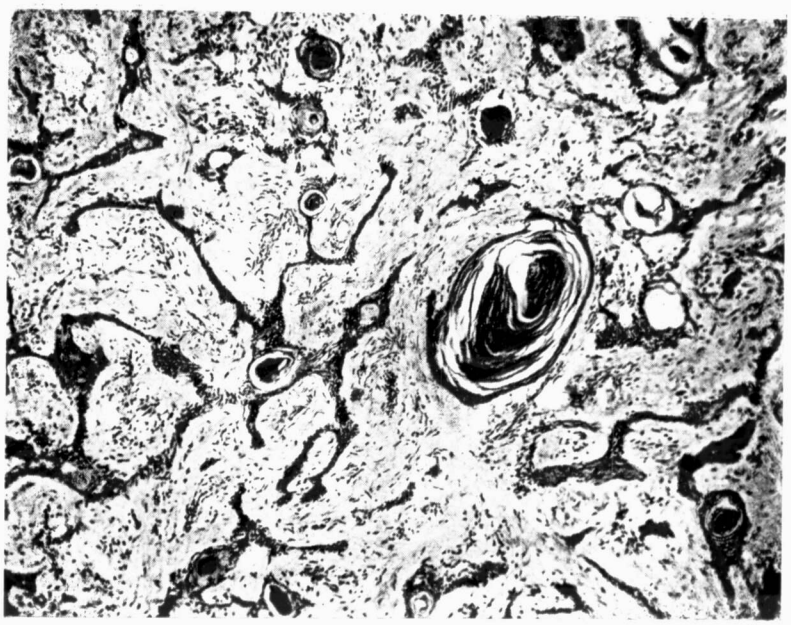

Fig. 5
Cell nest formation in a 'mixed' tumour
H & E × 80

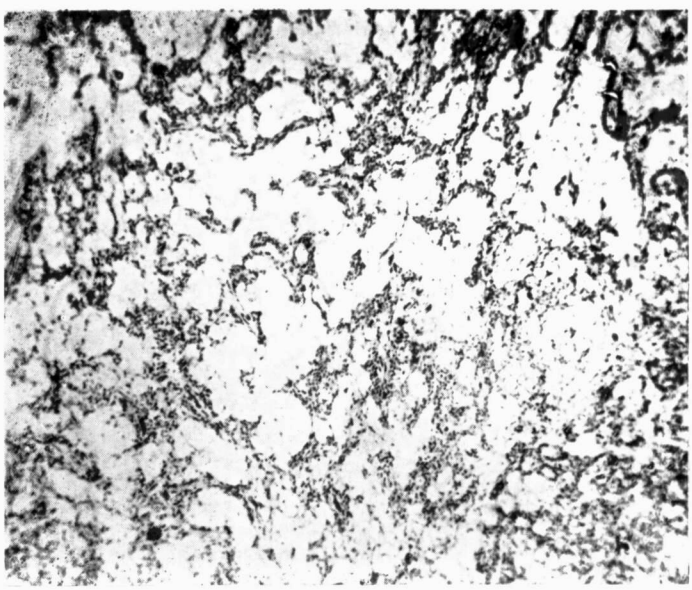

Fig. 6
Alveolar appearance produced by anastamosing trabeculae of tumour cells
H & E × 80

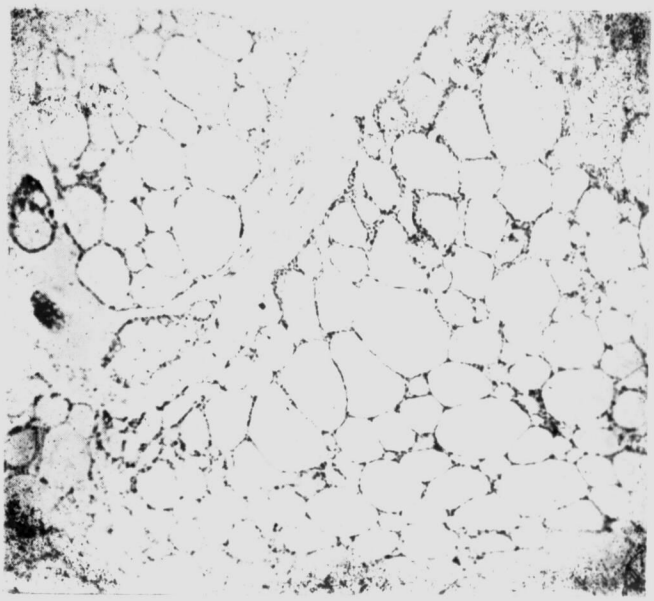

Fig. 7
'Cylindromatous' appearance in a 'mixed' tumour
H & E × 80

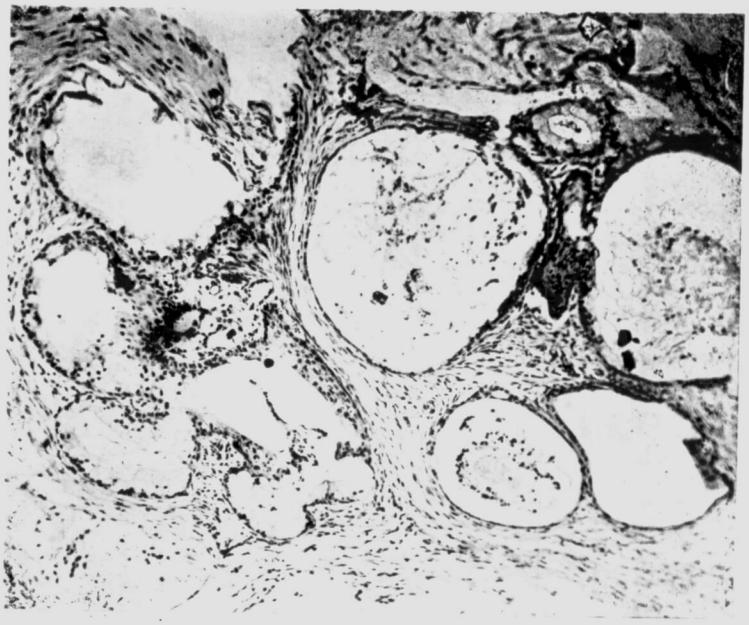

Fig. 8
Muco-epidermoid tumour showing ducts lined by mucus secreting epithelium as well as cells with epidermoid features
H & E × 80

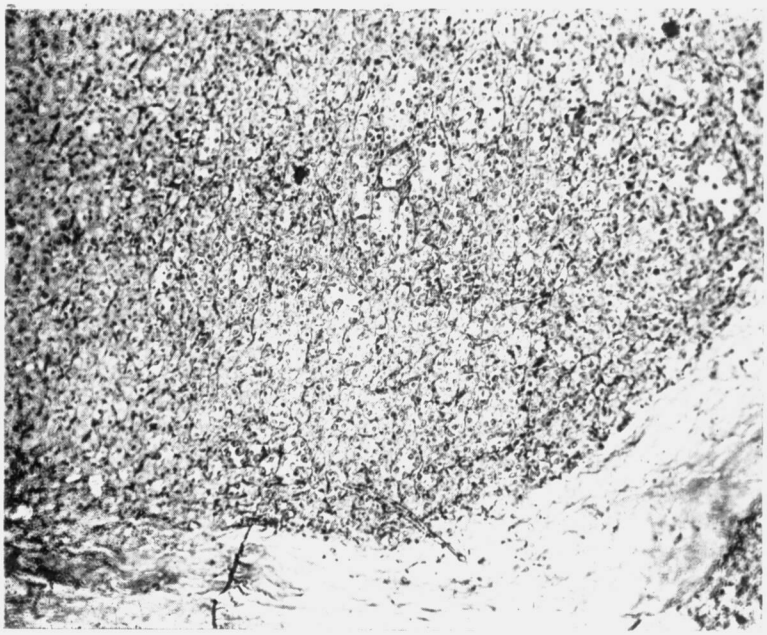

Fig. 9
Solid adenoma of parotid. (Capsule at bottom)
H & E × 80

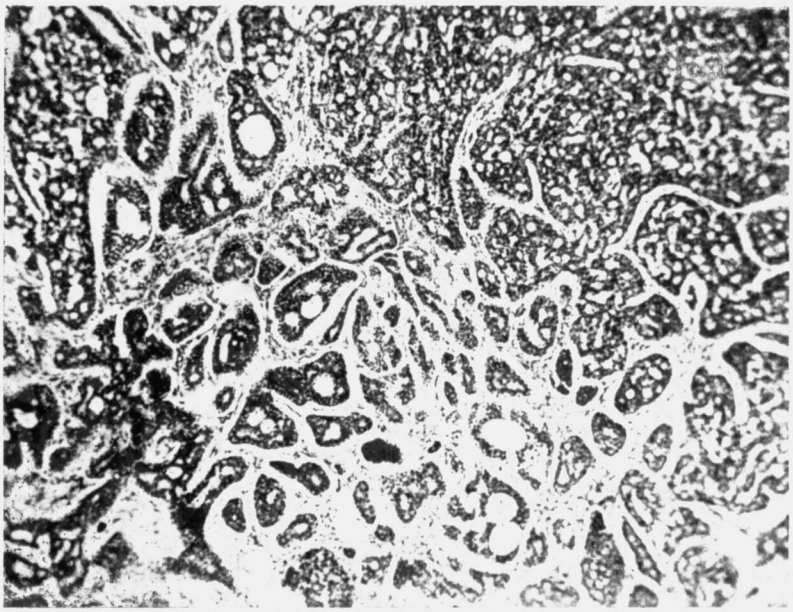

Fig. 10
Nasal tumour (Bronchial adenoma type)
H & E × 80

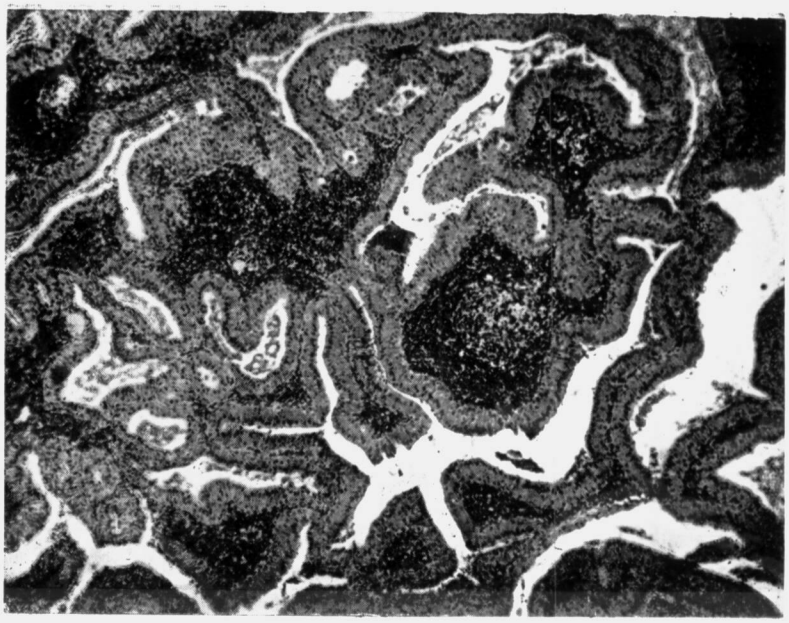

Fig. 11
Adenolymphoma
H & E × 80

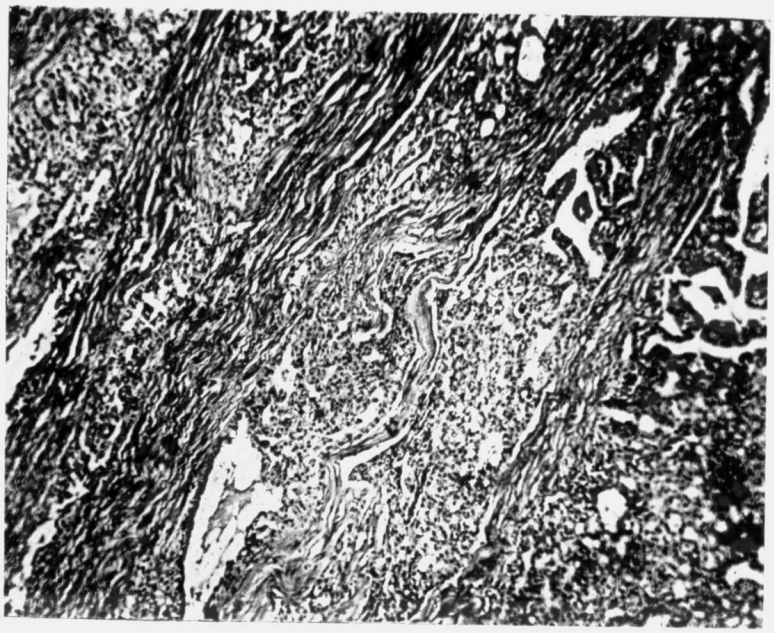

Fig. 12
Carcinoma of parotid
H & E × 80

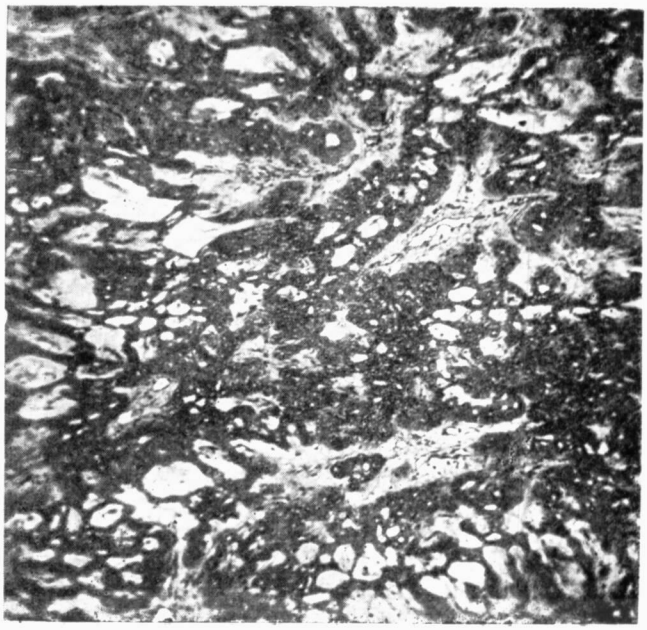

Fig. 13
Carcinoma of parotid
H & E × 80

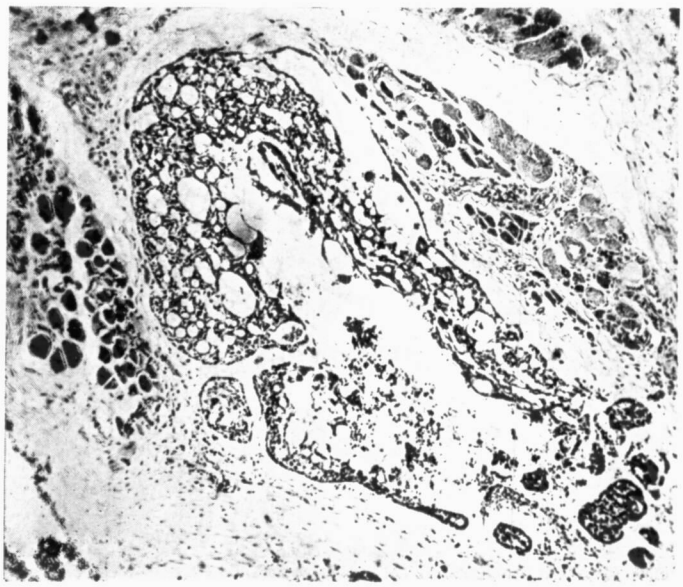

Fig. 14
A fairly well differentiated tumour infiltrating muscle
H & E × 80

account of which Willis (loc cit) has named these 'the pleomorphic salivary adenomas'. We have avoided such confusion by establishing certain criteria (vide supra) for their classification into a special group and by recognising some as the variants of this group resulting from metaplastic, proliferative, and degenerative changes of epithelium and stroma. As will be pointed out later the tumours of this group differ from the rest (excepting those classified as adenomas) not only in their morphology, but also in the histogenesis.

The incidence of the different histological groups, is much the same as in other countries. Seventy-eight per cent. belonged to the 'mixed tumour type'—an observation which is in agreement with the studies of McFarland (loc cit) Dockerty and Mayo (1942) Stein and Geschickter (loc cit), Ahlbom (loc cit) and Hellwig (loc cit). The adenolymphoma is regarded as a rare tumour and is said to constitute less than 10 per cent. of all the salivary tumours (Willis, loc cit). The actual incidence in the present series was only 2 per cent. Stewart et al (loc cit) have reckoned the frequency of the muco-epidermoid tumour at a little more than 5 per cent. of all salivary gland tumours—a finding which tallies with our incidence of 7 per cent. The frequency of adenoma in other countries, for purposes of comparison with our figures, is difficult to be ascertained, as most of the references are to isolated cases and as some writers have not made a distinction between the adenoma and the mixed tumour.

We found that 6 per cent. of tumours in these sites are true cancers. The carcinoma incidence as reported by Hellwig (loc cit) based on several records is less than 10 per cent.

The histogenesis of each type is now considered separately. The most difficult to explain and about which there is much diversity of opinion is the class of tumours designated 'the mixed tumour type'. The difficulties have arisen because of the marked degree of variation seen in this type as well as the presence in some, of epithelial elements combined with apparently mesenchymal derivatives. We have shown that tumours of the 'mixed tumour type' (Syn. 'mixed' salivary gland tumour) arise not only from the parotid gland but also from a variety of tissues (Table 2) all of which exhibit a common feature viz. they are composed of a secretory type of epithelium. By staining with Mayer's mucicarmine it has been possible to demonstrate that the tumour epithelium secretes a substance which stains red with mucicarmine and that the so-called 'mesenchymal derivative' is none other than this substance which the constituent cells secrete. This substance is probably mucin. There is evidence in our sections that the cartilage looking areas are formed as the result of the condensation of mucin round isolated cells as demonstrated by Fry (loc cit). The chief objection to this theory is that of Hellwig (loc cit) who states that the parotid glands in which these tumours are most common do not produce mucin, while the submaxillary and sublingual glands which secrete mucin are rarely the site of mixed tumours. We have found that the submaxillary gland is only second to the parotid in giving origin to these neoplasms. As regards mucin production it must be borne in mind that we are dealing not with normal tissues but an epithelium undergoing neoplasia. The secretory capacity of such epithelial tissues exceeds all expectations. Hence mucin which is apparently not a product of a normal gland may be one of a neoplastic gland. If it is agreed that this is

primarily a tumour derived from the epithelial elements of these secretory glands then the different histological patterns we have illustrated could be explained (1) by the variation in the amounts of mucin secreted (2) by differences in the distribution of the mucin within the tumour tissue (3) by metaplastic changes in the epithelium. Epithelial metaplasia which is a common feature in tumours (Willis loc cit) explains the diversity of epithelial types seen in these neoplasms. The squamous-celled metaplasia, by far the commonest in the 'mixed tumour type', is not unlike that seen in adenocarcinomas such as in the uterus and according to Willis (loc cit) 'it is not surprising that it should occur commonly in tumours of salivary origin since developmentally the salivary glands are but outgrowths of the ectodermal buccal epithelium. . . .' This change in the epithelium accounts for such variants as the 'cell nest type' (Fig. 5). We have evidence in our sections that the appearance of cell nests is produced also by the inspissation of mucinous secretion in the midst of tumour cells—the secretion taking an eosinophilic stain not unlike that of keratin (Fig. 15). While the various histological appearances we have observed in the 'mixed tumour type' could be explained on the above basis there is evidence that the more solid types (Fig. 2) consisting of spindle shaped cells with but only a few rudimentary glands and scanty mucinous stroma, take their origin from the cells that lie outside the secreting cells of the acini, called basket cells. These are contractile epithelial cells found in other secretory glands like the mammary, lacrimal, ceruminous and sweat glands and on account of their contractile nature have been designated myoepithelium. We agree with Sheldon (loc cit) that the source of at least some of the tumours is from myoepithelium and such a genesis is depicted in Fig. 16.

As distinct from this group of 'mixed tumour' there are the adenomas both solid (Fig. 9) and papillary and a further variety the bronchial adenoma seen most frequently in the nose. The solid and papillary adenomas are uniform in structure, and entirely lacking in the pleomorphism which characterises the 'mixed tumour'. As these too are epithelial in origin, most writers (Fry, loc cit; Harvey et al, 1938) do not make a sharp distinction between these and the 'mixed tumours'. However as their structure reveals slow growth and a high degree of differentiation we have regarded them as a separate group. An interesting sub-variety of this group is the bronchial adenoma (Fig. 10) four of which were seen in our series. In structure they resembled the bronchial adenoma described by previous workers (Willis, loc cit; Foster-Carter 1941). Three of the tumours occurred in the nose and one in the submaxillary gland. The bronchial adenomata arise in one of the larger bronchi and are now believed to take their origin from the bronchial mucous glands. (Foster-Carter loc cit.). These tumours however are not confined to the bronchus for Brock (1938) has reported such a neoplasm in the trachea. The nasal and submaxillary tumours in this series which resemble the bronchial adenoma in histological structure may also be regarded as having a similar origin from the mucous glands of the nose and submaxillary salivary gland which are comparable to the glands of the trachea and large bronchi developmentally.

The adeno lymphoma appears to have an origin different to that of the 'mixed' tumours and the adenomata. These were seen only in the parotid and submaxillary

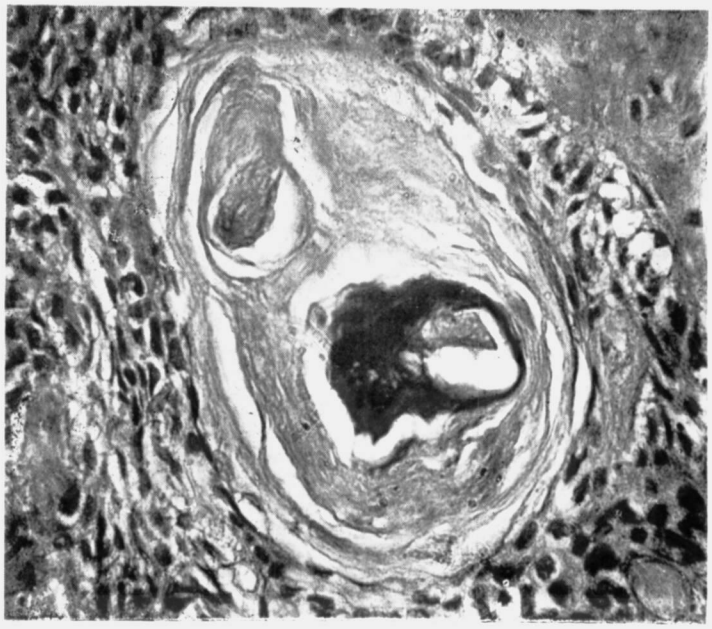

Fig. 15

Appearance of a cell nest produced by inspissation of mucin. Muci-carmine × 190

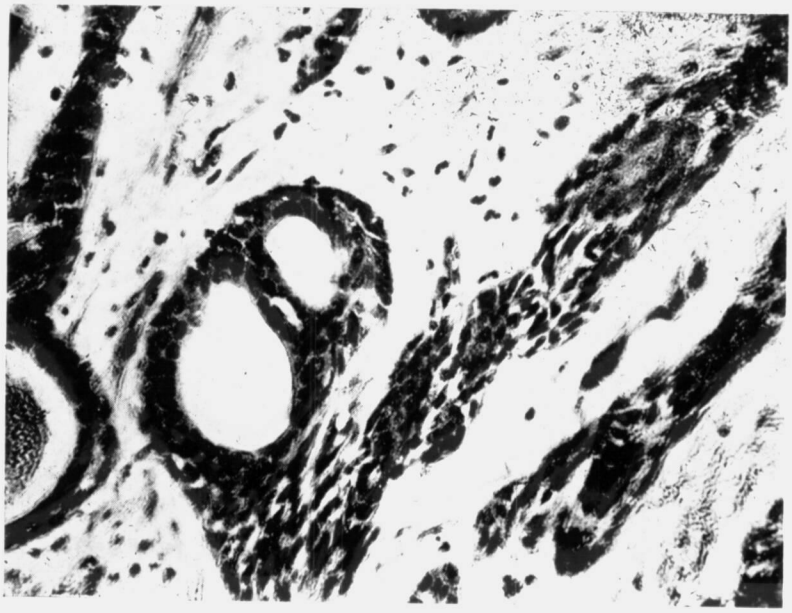

Fig. 16

Tumour arising from 'myoepithelium' lying outside the secreting cells of an acinus. (cf. Fig. 2)

H & E × 190

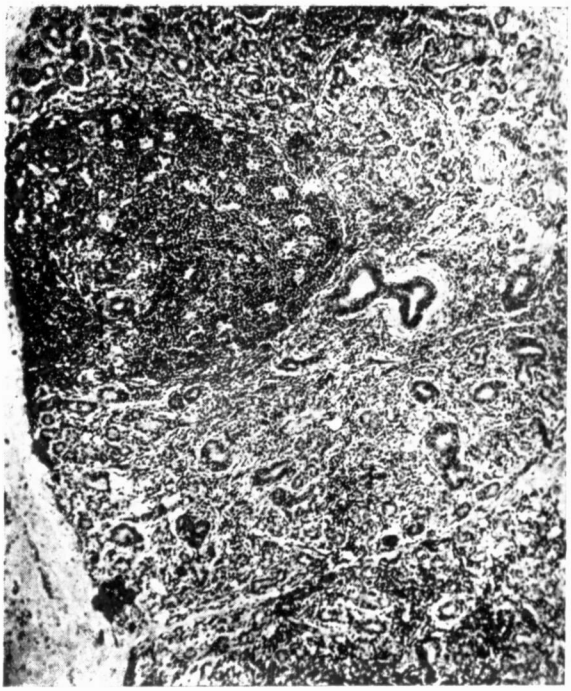

Fig. 17

A lymph node in the parotid region showing heterotopic salivary gland tissue

H & E × 80

glands—an observation which is in agreement with Willis (loc cit). These tumours arise from heterotopic salivary tissue in lymph nodes (Fig. 17). (Nicholson, 1922 ; Carmichael et al 1935).

The muco-epidermoid tumour is also distinct from the rest regarding histogenesis. The histological appearance suggests that these arise from the large ducts of the salivary glands which contain scattered mucous cells within the duct epithelium (Stewart et al, loc cit). The characteristic appearance is the result of abnormal differentiation (metaplasia) into mucous and squamous cells (Fig. 8).

There has been some difference of opinion regarding the malignancy of the ' mixed ' tumours. Because of their slow growth and the rarity of metastasis they have been considered to be benign. On the other hand Willis (loc cit) disputes the innocency of these tumours and considers that the terms ' innocent ' and ' malignant ' when applied to these neoplasms are only relative terms. 'According to him all gradations of behaviour as well as of structure. are seen between the highly differentiated and innocuous growths and poorly differentiated metastasising carcinomas. He also believes that carcinomas differ from the mixed tumour type only in their rate of growth and degree of malignancy and not in their histogenesis. We too have noticed all gradations of structure from solid growths with hardly any differentiation excepting the formation of rudimentary tubules, to glandular types. Differentiation, however, cannot be accepted, in the case of these neoplasms, as the sole test of malignancy, for we have seen poorly differentiated solid growths without evidence of malignancy such as mitoses, metastases and evidence of infiltration, while one such tumour with a certain degree of differentiation showed definite infiltration of muscle (Fig. 14). Our material also failed to show that carcinoma and the mixed tumours have a common histogenesis, for, excepting in the previous instance with evidence of infiltration, there was only one other case out of 11 carcinomata where the histological picture revealed an origin of the carcinoma from a previous tumour of the mixed tumour type. In all the remaining cases the carcinoma showed a structure peculiar to itself (Figs. 12 and 13) and in no place was a semblance to a mixed tumour noticed. For these reasons we believe that excepting in a very small proportion, carcinomata arise *de novo* and are frankly malignant from their onset.

Summary

(1) A study has been made of tumours arising from the glands in connection with the mouth, nose and orbit, based on consecutive biopsy specimens from these regions. 178 such tumours have been examined during the last 14 years. The incidence in Ceylon (viz. 2% of all tumours, or 12 per year) is not different to the incidence recorded in European countries.

(2) Although a very large number viz. 93% arose from glands opening into the mouth, a few viz. 6% took their origin in the lacrymal glands and the mucous glands of the nose. The parotid gland appeared to be the most frequent single site of origin—a finding which is in agreement with other workers. However, a larger proportion of tumours arising in the submaxillary, sublingual and palatal glands has been noted in the present series.

(3) Five histological types, viz. ' mixed ' tumour type, adenolymphoma, muco-epidermoid type, carcinoma and adenoma have been described and their histogenesis has been discussed. Although the most prevalent variety was the ' mixed ' tumour type, other types, differing in morphology and mode of origin, have also been met with in these situations. The relative frequency of these different types was much the same as in European countries.

(4) Although tumours occurred at all ages, the largest number (46%) were found in the 3rd and 4th decades.

(5) No significant differences in the sex incidence were noted in the case of parotid gland tumours, but tumour formation at other sites appeared to be more common in females.

(6) Evidence has been adduced to maintain the epithelial origin of the ' mixed ' tumour type and the pleomorphism displayed by this type is explained on the basis of variation in amounts and differences in the distribution of its secretion (mucin) and the metaplastic changes in its epithelium. The more solid growths appeared to arise from one of the epithelial components viz. the basket cells (myoepithelium) and the inspissation of mucinous secretion sometimes simulated cell nests.

(7) The innocency or malignancy of the ' mixed ' tumours cannot be determined solely by histological criteria. The least differentiated types exhibited no malignant features such as mitoses, metastases and infiltration while a fairly well differentiated tumour infiltrated the muscle.

(8) In the present series only 2 carcinomata were superimposed on a previous ' mixed ' tumour. As, in the remaining 9 carcinomata, there was no evidence of an origin from a ' mixed ' tumour, it is suggested that these arose *de novo* and were frankly malignant from their onset. Six per cent. of all the tumours arising in these sites were carcinomatous and this study has revealed that cancer in these situations occurs at an age period lower than that recorded for malignant tumours at other sites.

Acknowledgements

We offer our grateful thanks to Professor W. A. E. Karunaratne for facilities, to Mr. K. M. M. Michael for the photomicrographs and to Messrs. G. A. H. Jayaweera, P. D. S. Amerasekera, and J. C. Fernando for technical assistance.

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