Nilgiris (6,300 feet) applies here. He suggested that warm winds blowing from below brought the mosquitoes up; here they would have to be blown 20 miles, up 4,000 feet, and through a narrow twisting valley, which is inconceivable.

A hypothetical diary of events of the epidemic on the "Equator farm," based on the above considerations, is as follows:

(i) Gravid *A. gambiae* were transported to the farm in motor vehicles coming by road from a malarious valley 20 miles below. *March.*

(ii) Eggs laid and first (and only) generation emerged. *Beginning of April.*

(iii) These adults bit African gametocyte carriers. *April.*

(iv) Sporozoites in glands. *About May 13.*

(v) Human cases. *May 24 to June 7.*

(vi) Death of last infected mosquitoes. *About May 27.*

Summary

Epidemics of malignant tertian malaria began for the first time in Londiani in the year 1941 and were repeated on a milder scale in succeeding years (May to July). The altitude of the locality is 7,500 to 7,800 feet. A few cases of benign tertian malaria also occurred.

In 1944 a localized outbreak of malignant tertian malaria occurred on a farm about 20 miles to the north of Londiani, at an altitude of 8,300 to 8,500 feet. It lasted for a fortnight only.

Anopheles gambiae Giles was found at both places, and is the probable vector.

Climatic records indicate that the breeding of this species is possible at 8,300 feet only during the month of March and at 7,500 feet only during March, April, and May.

Temperature records suggest that the completion of the sporogonic cycle is possible only because *A. gambiae* spends practically all its life indoors, where the temperature is several degrees higher than outside. The external environment is too cold for development to occur.

It is probable that *A. gambiae* is reintroduced annually by road and rail transport.

I have to thank the Hon. Director of Medical Services, Kenya, for permission to publish this paper, and Mr. J. O. Harper, Entomological Field Officer, for help in some of the mosquito surveys.

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Medical Memoranda

Mediastinal Emphysema and Bilateral Pneumothorax after Tracheotomy

The following case of complications after tracheotomy is thought to be interesting enough to be put on record.

CASE REPORT

Early on Christmas morning I operated on a little girl, 2½ years old, suffering from acute asphyxia; by 10 a.m. (10 hours afterwards) the child had died. The obstruction had come on quite suddenly the previous evening. There was marked retraction of the intercostal spaces and the suprasternal notch; the throat was injected, but no membrane was seen. The temperature was 100° F. The mother stated that there had been an alteration in the voice for some time.

Tracheotomy was performed in the usual way without undue haste under light general inhalation anaesthesia. The engorged veins over the trachea were ligated to preserve haemostasis; the layers of the cervical fascia were then incised—the pretracheal transversely—and the tracheotomy tube was inserted without difficulty through an opening made into the trachea. The breathing improved as a result, but did not seem to be completely relieved. On return to the ward the child's condition was fair, but later she became cyanotic, gasped for breath, and finally stopped breathing and died.

I am indebted to Dr. Donald Teare for the post-mortem findings: "Small wart-like papillomata of the vocal cord, tracheitis, acute bronchitis, emphysema of the mediastinum (some of the bullae being 2 cm. in diameter), and bilateral pneumothorax were found." He

adds the comment that "acute respiratory infection was superimposed on the papilloma of the cord so that the tracheotomy did not completely relieve the respiratory distress." Though this is the first case of this nature that I have encountered, it would appear from the literature that this complication is not so rare as might be supposed. Minor degrees of emphysema of the mediastinum probably resolve and are therefore overlooked unless a radiograph is taken, and severe conditions, with pneumothorax ending fatally, may not be properly diagnosed unless the disaster which has overtaken the lungs is recognized.

At operation a suture was placed at the top end of the wound because a deep and rather mobile trachea necessitated a long incision, as is often the case in a child, otherwise the wound was left open and lightly packed with gauze beneath the cannula. Close suturing has been thought to be a possible cause (C. Jackson). There is no reason to suppose that the pleural dome was injured at the time (another cause cited). The usual explanation given is that air enters through the wound in the cervical fascia, becomes imprisoned in the mediastinum, especially when the obstruction is not relieved, and finally reaches a tension high enough to rupture the mediastinal pleura, which is generally thin, particularly in children. When there is a pneumothorax there seems always to be a coexisting mediastinal emphysema; the pneumothorax too is usually bilateral.

Michels (1939) has suggested the preliminary use of the bronchoscope to restore an adequate airway as early as possible and so convert a struggling and restless child into a quiet one. At operation it would seem desirable to disturb the layers of the cervical fascia as little as possible after incising them. The possibility of the sudden onset of pneumothorax as a complication after operation, as shown by hyperresonance, a displaced heart, and absent breath sounds, must be kept in mind, and appropriately treated by aspiration when it appears.

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An Unusual Case of the Labyrinthine Fistula Symptom

Rarefaction and compression of air in the external auditory meatus producing nystagmus, giddiness, or other labyrinthine reactions is known as the labyrinthine fistula symptom. The syndrome is caused by the partial destruction of the bony wall of the labyrinth (commonly by chronic otitis, rarely acute), so that alterations in atmospheric pressure within the external auditory meatus are transmitted through the perforated drum membrane to the labyrinthine fluid. This syndrome is important because it indicates direct communication between the infected middle ear and the labyrinth, and in consequence requires special care.

CASE HISTORY

The patient, a man aged 35, was admitted to the West Middlesex County Hospital on Aug. 28, 1943, having had right otorrhoea of 16 years' duration. The ear had been operated on in 1927, a few weeks after onset of aural discharge, when an incomplete mastoidectomy was performed. For eight days previous to admission he had complained of right-sided headache. This had been followed five days later by the development of pain in the right ear, accompanied by true vertigo—objects in the room moving round him in a horizontal plane—and effortless vomiting. He could not say whether objects moved right to left or left to right. Once during those eight days, while lying in bed on his right side, he had felt "giddy" and vomited.

On examination there was a non-pulsating offensive purulent discharge from the right ear. No nystagmus was obtained when carrying out the so-called "labyrinthine fistula test" (rarefaction and compression of air in the external meatus). There was no tenderness over the mastoid. No abnormality of the central nervous system was found, and the C.S.F. was normal. The discharge gave a growth of anaerobic streptococci and the blood count showed a moderate leucocytosis. The history was suggestive of a labyrinthitis. However, signs of the labyrinthine fistula symptom remained negative, although the patient consistently complained of giddiness and headaches.

Three days after admission he dreamt* that he was in a motor-car which was going round and round, faster and faster, from right to left. When he awoke he was violently sick. Inquiry revealed that he had been lying with his right temporal region pressing on the edge of the mattress. Pressure was applied to that region just above the auricle, when a horizontal rotary nystagmus—slow movement to the left—occurred, and the patient had a recrudescence of the above symptoms. It was noted that the old operational scar was more extensive than usual and reached high up on the right temporal region. The E.N.T. surgeon was consulted, and it was decided that the reason for obtaining nystagmus in this unusual site was that connecting the external scar with the labyrinthine fistula

* Dreams in patients suffering from labyrinthitis with fistula symptoms were described by K. Eisinger and P. Schilder in *Mscr. Psych. Neurol.*, 1929, **73**, 314.

was a band (probably fibrous) which transmitted to the labyrinth pressure applied to the external scar.

A radical mastoidectomy was performed. The bone was found to be sclerotic, and the middle ear contained granulation tissue, pus, and a cholesteatoma. There was a fistula extending to the horizontal semicircular canal filled with granulation tissue, down to which the fibrous tissue of the old incision extended. Thus the suggested causative mechanism was confirmed.

COMMENT

This case has been recorded as an interesting example of the "labyrinthine fistula symptom," in which nystagmus and giddiness were obtained by pressure over the temporal bone and not on compression or rarefaction of air in the external meatus. The narrow external meatus and the scar condition which had developed after the first operation explain this abnormal symptomatology.

FIG. 1.—A, the middle fossa. B, the antrum. C, the interior of the horizontal bony labyrinth.

FIG. 2.—High-power field of marked circle in Fig. 1. The fistula is indicated by an arrow.

The photomicrographs taken from a case of purulent labyrinthitis, explain the mechanism of the fistula symptom, demonstrating the perilymphatic space exposed through the erosion of the bony semicircular canal. This histological section was kindly lent to me by Mr. Eisinger, E.N.T. surgeon attached to this hospital.

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Reviews

THE AMINO-ACIDS OF FOOD

The Amino-acid Composition of Proteins and Foods. Analytical Methods and Results. By Richard J. Block, Ph.D., and Diana Bolling, B.S. (Pp. 396. \$6.50 or 36s.) Springfield and Baltimore: Charles C. Thomas; London: Baillière, Tindall and Cox.

The publication of this well-produced, if rather high-priced, monograph is timely for two reasons. First, it collects in one place data that have so far been available only after prolonged search in a widely scattered literature; secondly, it shows how very much more work is needed if we are to have anything like a complete picture of the amino-acids required by man and of their quantitative distribution in his foods. The authors are well-known authorities in the United States, where they have carried out and published new or improved methods for estimating histidine, threonine, leucine, *iso*-leucine, and valine, as well as extensive studies in protein chemistry, notably on serum protein and on keratin and allied substances.

One would therefore expect their book to have a strong practical bias, and in this one is not disappointed. The general lay-out of the first eight chapters is similar: methods for breaking down the proteins of food are given, and these are followed by accounts of any essential separations that must then be carried out before the application of more or less specific tests for individual amino-acids. In these chapters the authors consider in turn the diamino-acids (arginine, histidine, lysine, hydroxylysine, and citrulline); the aromatic amino-acids (tyrosine, tryptophan, phenylalanine, diiodotyrosine, and thyroxine); the sulphur-containing amino-acids (cystine, cysteine, and methionine); the β -hydroxy amino-acids (serine and threonine); the "leucines" (leucine, *iso*-leucine, and valine); the dicarboxylic amino-acids (aspartic and glutamic acids); glycine and alanine; and proline and hydroxyproline. Each of these specialist chapters ends with detailed tables showing the amounts of the relevant amino-acids present in food and other proteins, in so far as this information is available. Some of it is doubtless new and derived from the authors' own laboratory.

In Chapter IX attention is turned to a consideration of general methods for amino-acids—and here there are certainly to be found matters of interest to others than those concerned with practical problems of food composition. That the book has gallantly struggled to keep up to date with a very rapidly moving subject is witnessed by the inclusion here of brief references to the partition chromatography introduced by Gordon, Martin, and Synge, and extended by these workers and by Catch, Cook, and Heilbron—an all-British contribution to this branch of science—as well as to the microbiological methods now being rapidly developed at several laboratories in the United States. Both these procedures will doubtless deserve and get much more detailed attention in the many subsequent editions of this admirable monograph, to which we look forward with interest and the certainty of profit.

A tenth chapter consists of summary tables. There is a slight dogmatic tendency, hardly justified by the experimental evidence available, to be found in the authors' inclusion here of data on the daily quantitative amino-acid requirements of man. Further, they have included histidine in the category of "essential," in spite of the findings of Rose, Haines, Johnson, and Warner, whose paper is not mentioned in the bibliography of some 700 titles. Nor are the titles mentioned of certain other papers by Holt and colleagues, and of yet others by the Rose group; these all bear on the problem of essentiality, not perhaps strictly germane to the book's main theme. Yet the conclusions of these papers are given in Chapter X, and the reader should surely be made able to consult the original papers—otherwise this chapter may appear to consist of summary tables in a sense not intended by the authors. Besides the bibliography there are both author and subject indexes, as well as an interesting and unusual page of typographical information. But the printer slipped once—when setting the title of Chapter VII in the table of contents (p. xiv). The authors, again, can surely not have meant to instruct the user of the polarigraphic cystine determination to keep the voltage constant.

However, criticism on these and other minor points is disarmed in advance by the authors' request for amendments and