metropolitan boroughs up to 1935. It will be seen that in comparison with the general child population the incidence of diphtheria among immunized children is distinctly low (an attack rate of 1.77 per 1,000 immunized against 9.04 for the general child population) and that there has not been a single death from diphtheria in the forty-one cases occurring in the immunized group.

I am indebted to the Special Hospitals Department of the London County Council for the information contained in the table, and to Dr. G. H. Dart, medical officer of health for Hackney, for much helpful advice.

VASOMOTOR RHINORRHOEA, WITH ASTHMA, ASSOCIATED WITH MENSTRUATION

BY

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The relation between nasal disorders and activity of the sexual organs, both in the male and in the female, was recognized by Hippocrates, Celsus, and Aristotle, and also in the Ayurveda, the ancient Hindu medical classic. J. N. Mackenzie (1884), an ear, nose, and throat surgeon of Baltimore, was the first writer of more modern times to make a systematic clinical study of this subject and to survey the literature. He observed in a certain number of women, whose nasal organs were otherwise healthy, that the nasal erectile tissue became congested at the time of the period, and even when the period was expected but happened temporarily to be suppressed. He said that his own experience was not great enough for him to say whether these changes also took place during pregnancy; but they have now, in fact, been seen to occur (Mortimer, Wright, and Collip, 1936a, 1936b, 1937). Moreover, the change is a steadily progressive one, with exacerbations when the periods would have been expected to be due but for the pregnancy. Mackenzie was of the opinion that nasal congestion was not confined only to women at the time of the periods, but that it might also occur during or after sexual activity in both sexes.

For fifty years the significance of Mackenzie's and other similar work has passed unnoticed and unexplained, but these clinical observations have now acquired a fresh significance in the light of recent advances in endocrinology, and are supported by a large body of experimental evidence, obtained mostly from work on monkeys (Mortimer *et al.*, 1936a, 1936b, 1937).

Hormonic Action on the Nasal Mucosa

Nasal turgescence is one of the "specific skin responses" to increase of circulating sex hormone occurring at oestrus. It can be provoked by injection of the appropriate oestrogenic hormones into male and female monkeys, including, as controls, those which are immature or castrate. Specific skin reactivity can be shown by simple transplantation experiments, where, for example, a piece of specific skin transplanted into a non-specific area still shows the specific response, and vice versa. Thus, non-specific skin transplanted into the perineal area of a monkey stands out as a "pale island

of skin in brilliantly coloured surroundings" (Bachman, Collip, and Selye, 1936).

This specific action of oestrogenic hormones on the nasal mucosa has been investigated and put to a therapeutic purpose by Collip and his co-workers in cases of atrophic rhinitis and ozaena. They observed much improvement after a course of local application of the hormones (oestrone or oestradiol in an oily solution). Incidentally, this series of cases showed an unusually high percentage of deafness and otosclerosis, which in a few cases responded to treatment, although otosclerosis is generally considered to be a most intractable cause of deafness.

The nasal congestion which is such a feature in the oestrous cycle of the higher primates has to a very large extent been lost in human phylogenetic development. None the less, it seems that the majority of women have some degree of nasal turgescence during menstruation and pregnancy. The bleeding of "vicarious menstruation" has been observed to come not from Kiesselbach's septal triangle, as is usually the case, but from the congested middle and inferior turbinates (Mortimer *et al.*, 1936b).

Many women complain that their noses are "stuffed up" or "run" immediately before or during their periods. In an unlucky few the turgescence may give rise to even more severe symptoms. In some women the nasal congestion may result in an attack of vasomotor rhinorrhoea; this is not an allergic reaction, but an exaggeration of a normal physiological response. Why this should be so one cannot explain: cellular pathology is even less understood than cellular physiology. "The reactivity of the tissues . . . is an important factor in determining the effects of hormone secretion" (Levy Simpson, 1938).

This type of vasomotor rhinorrhoea which occurs in association with the menstrual function might be termed "oestrogenic rhinorrhoea"; but this does not mean to say that an allergic factor is necessarily excluded. It usually occurs regularly about two days before the onset of the menstrual period, during which an attack of asthma may develop. The asthma is often slow in termination because, as frequently happens, a catarrhal bronchitis of bacterial origin may supervene. The whole illness is likely to take some time to resolve, only to recur with the next menstrual cycle. As this syndrome often first appears in children of school age who are taking their higher examinations, the resultant disability is serious. The patients are seen for treatment usually on account of their asthma only; the preceding rhinorrhoea, which is much less spectacular and disabling than the asthma, is either disregarded or self-diagnosed as a "cold in the nose." If this self-diagnosis is accepted as such and the asthma treated symptomatically, then the general prognosis as regards future attacks of asthma is not hopeful. But a careful questioning will reveal the true nature of the "cold"—that is, typical vasomotor rhinorrhoea, with no malaise or fever—and the prognosis is then materially altered.

Nasogenic Asthma

Asthma produced in this manner, by a nasal affection, is termed "nasogenic asthma," and its mechanism is reflex through the naso-pulmonary reflex arc. The control of bronchial calibre and the influence upon it of nasal stimulation has been studied with the bronchoscope in experimental animals and the reflex paths worked out

(Maxwell Ellis, 1938). The existence of a similar control and influence in human beings is largely inferential from clinical observation, but there is also a certain amount of experimental support (Myers, 1929). The nasal element as the cause of an attack of asthma is not necessarily very obvious; the asthma may be preceded simply by a few sneezes or trivial nasal irritation, or running from the nose or eyes, the latter being a reflex via the sphenopalatine ganglion. In doubtful cases, when the patient is seen at the beginning of an attack of asthma, one may help to establish the diagnosis by spraying the interior of the nose with 2 per cent. cocaine solution, which may abort the attack by interrupting the naso-pulmonary reflex arc.

The simplest and most effective means of maintaining an interruption in the naso-pulmonary reflex arc is by the method of intranasal zinc ionization; this acts in much the same way as does the diagnostic cocaine spray. It is a non-specific method of rendering the nasal mucous membrane less sensitive to whatever may happen to be the sensitizing agents, and thus of interrupting unduly sensitive reflex arcs. The rationale and technique of intranasal zinc ionization has been dealt with fully and adequately by Shields (1936, 1937). He points out that the technique literally is an *intranasal* one, and that there are many possible sources of error. In some cases the sensitive areas may be high up in the nose and not entirely accessible by the ordinary gauze-packing technique. Ionization may then be carried out by continuous irrigation, as described by Shields (1937). Naturally it is essential to look for and attend to nasal or dental sepsis, or other well-recognized factors in the causation of asthma. In many cases also there may be easily detectable factors such as pollen or food susceptibility (Kennedy, 1936; Maxwell, 1936). Vasomotor rhinorrhoea is the outward sign of many possible inward disturbances, the nose being as it were a common denominator or "final common path."

Two Illustrative Cases

The following are two illustrative cases of menstrual asthma preceded by vasomotor rhinorrhoea which were sent to me as cases of simple asthma and which had previously been treated as such. It was decided to treat the apparent nasal origin of the asthma by the method of intranasal zinc ionization on the ground that it is effective in other cases of asthma caused by vasomotor rhinorrhoea, whether the latter is seasonal (hay-fever) or non-seasonal.

CASE I

A girl aged 14 was sent to see me on November 12, 1937. She was apparently normal physically, including the nasal mucosa. She had had a severe attack of asthma during her first period, and again with her second and third. Questioning elicited the fact that she had had a "cold" two days before each period, and further questioning made it obvious that the so-called cold was an attack of vasomotor rhinorrhoea. A first treatment by intranasal zinc ionization was given. She was seen again on November 19, and was menstruating, the period having come on a week earlier than was anticipated. She had had an attack of sneezing, with slight rhinorrhoea, on November 16, and the period had begun the following day, but there was no asthma. She was given second and third treatments on November 26 and December 10. The mother reported on January 3, 1938, that the girl had had no further symptoms. She again reported on May 20 that the patient was continuing well, and "had not had to stay away from school," but that there had been an insignificant running from the nose premenstrually. This latter observation may be

taken as reassuring from the point of view of the effects of the treatment, as it indicates that the nasal erectile tissue has not been destroyed and has not lost its capacity for responding to circulating oestrogenic hormones. If the mucosa returns to its previous more than normal responsiveness, then the treatment can be repeated. But this no more detracts from the value of the treatment as a method of controlling symptoms than does the necessity for repetition of injections in diabetes or pernicious anaemia.

CASE II

This is a rather more complex case, there being obvious dietary factors as well. A girl aged 16 was first seen by me on April 7, 1937. She had had asthma, preceded by "running colds," for two years since she had come to live by the sea. Inland she was well, except on one or two occasions. As a child she used to have severe urticaria after eating eggs or chocolate; when seen by me she was "upset" by milk and eggs during the attacks of asthma, but not in between. Her history showed that her asthma coincided with her periods and was preceded by vasomotor rhinorrhoea. On physical examination she was found to be normal with the exception of the turbinates, which were of a pale blue colour. The irregular rhythm of her asthma and the history of food susceptibility showed that there was more than one (oestrogenic) factor, but as the nose was the "final common path," and as she had had the usual treatment for asthma, it was decided to treat the nose. After a course of treatment by intranasal zinc ionization she had no more rhinorrhoea and consequently no more asthma. When last heard of, on May 31, 1938, she was still well.

One cannot disregard the possibility that this form of vasomotor rhinorrhoea, with or without asthma, may have some psychological basis, associated as it is with sexual manifestations. But in Case I the vasomotor rhinorrhoea preceded the patient's first period, the onset of which she obviously could not have anticipated. Further, in the two cases quoted the patients considered their "colds" as of no great inconvenience or disability; it is a universally recognized principle in psychology that the significance of a psychological symptom is in direct proportion to its value to the patient, and therefore this cannot be great if the owner of the symptom treats it as of not much importance.

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The Autumn Exhibition of the Royal Institute of British Architects is to deal with the subject of the ordinary small house. It is to be opened jointly by Miss Ellen Wilkinson, M.P., and Mr. J. B. Priestley on Thursday, October 13. The object of the exhibition is to show ways in which the architects think the small house, provided for people of moderate means, might be improved. The exhibition will be open to the public, admission free, from October 14 to 29 at the R.I.B.A., 66, Portland Place, London, W.1. It will then, like all R.I.B.A. exhibitions, go on a tour of provincial centres and London suburbs for a period of two years.