advantages it bestows. To regard tracheotomy as too drastic an undertaking shows a failure to appreciate the gravity of the issues at stake. All too frequently patients with head injuries die, not from their primary injury, but from a chest complication which might have been avoided altogether, or at least mitigated, if efficient bronchial drainage had been established early.

A tracheotomy by itself is not sufficient. It must be combined with frequent changes of posture, at least hourly, to allow secretions from the various lobes of the lungs to drain into the more accessible bronchi or trachea, from which they may be removed by suction. A warning is necessary if a tracheotomy is considered only after an endotracheal tube has been in place for a long time. If there is any degree of tracheitis or ulceration of the cords there is a risk that the tracheotomy wound may become infected, and this in turn will lead to fibrosis, and possibly to stenosis of the glottis and a permanent tracheostomy.

Case 3.—A man aged 28 was admitted to hospital with a severe head injury as a result of a road accident. He was intubated soon after arrival, and except for short intervals the tube remained in position for four days. By this time his cords were ulcerated and an attempt was made to maintain an airway by a relay of nurses holding his lower jaw forward. After three days a tracheotomy was performed. A clear airway was assured, and the patient, though remaining unconscious, was kept free from lung complications for a whole year. The improvement of his cerebral condition was slight, but as the cough reflex returned an attempt was made to close the tracheotomy; this had to be abandoned because of a complete stenosis of the glottis. The criticism here is not that a tracheotomy was performed but that it was performed too late.

Bronchoscopy is a valuable manoeuvre, and should be performed if there is evidence of atelectasis or if secretions cannot be removed by "blind" aspiration. The importance of early bronchoscopy must be stressed, for it will be of little value if withheld until secondary changes appear in the lungs as the result of infection or obstruction of the bronchi. By itself it is only a temporary measure, and must therefore be used as an adjunct to the general treatment already described.

The previous cases show the pitfalls which abound for those concerned with the management of the unconscious patient. Case 4 is included, therefore, to show how satisfactory the result may be when the treatment as advocated in this paper is followed and is instituted at the correct time.

Case 4.—A man aged 66 was admitted to hospital after a fall from his bicycle. He was unconscious and a diagnosis of subdural haemorrhage was made. In spite of a decompression he remained unconscious. Twelve days after the accident, during which time he had become increasingly "chesty," he developed a left lower lobe atelectasis. The temperature rose to 101° F. (38.3° C.), pulse to 110, and respirations to 30. He was slightly cyanosed. Bronchoscopy was performed and a quantity of mucus was aspirated, mainly from the left side. A tracheotomy was performed the same day, and a further quantity of mucus was removed. Changes of posture to encourage drainage from the lungs were made more frequently, and on the following day the temperature had fallen to 99° F. (37.2° C.), the pulse to 90, and the respirations to 25. Six weeks after injury the patient was co-operative and making a good recovery. The cough reflex had returned and the tracheotomy was therefore closed.

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CONGENITAL ATRESIA OF THE OESOPHAGUS

BY

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Congenital atresia of the oesophagus is commoner than is generally realized, and if recognized early can be amenable to surgical treatment. The condition is very readily overlooked, but if the possibility is borne in mind it can be diagnosed without difficulty. The purpose of this article is to report a series of cases in support of these statements and to describe the technique of treatment that has been carried out at the Department of Thoracic Surgery of the Frenchay Hospital.

Incidence

The incidence of congenital atresia of the oesophagus has been stated to be about 1 in 2,500 births (Franklin, 1947; Grey Turner, 1949). In our experience the incidence is much greater than this, presumably because many cases are not recognized and deaths are regarded as having been due to atelectasis or pneumonia.

One of us is a consultant paediatrician to a clinical area with a population of about 100,000 in which there are approximately 2,000 births annually. He has seen five cases during the course of two years. The first was in May, 1948, and the patient was 6 days old and very ill with pneumonia, which terminated fatally before surgical treatment could be arranged. The diagnosis was confirmed at necropsy. The remaining cases are described below, being Nos. 2, 4, 7, and 10.

The incidence of cases in this clinical area in which the diagnosis was confirmed was thus 1 in 800 births. It is not to be assumed that all such cases were referred for consultation or that they were diagnosed if so referred. Hence it is reasonably certain that the incidence is distinctly greater than 1 in 800. There is no justification for believing there may be a special incidence of the condition in the area where these observations were made. No epidemic of rubella or other disease that might cause it has been recognized and there has been no undue incidence of other congenital abnormalities.

It is easy to understand how the condition can be overlooked. It presents no easily recognized signs. The infant brings up some frothy mucus during the first day or two of life. Attempts at feeding lead to regurgitation, choking, and probably cyanosis. These events in a newly born infant may call for no special concern on the part of the nurse. By the third day chest symptoms are developing which are attributed to infection, and all further feeding difficulties and respiratory distress are attributed to pneumonia. This terminates fatally when the infant is about a week old, and the cause of death seems obvious. If a necropsy is performed the oesophageal condition is very easily overlooked.

In our cases we have noticed that the condition is often associated with atelectasis, particularly of an upper lobe. The reason for this is not altogether clear, but it may arise from inhalation of saliva, the right upper lobe being a common site for any inhalation phenomenon. Inhalation

of feeds is not necessarily an explanation, since in two cases the atelectasis had been recognized before any feeds were given. This may explain why some cases are overlooked. The atelectasis is recognized, and is regarded as the explanation of the infant's condition. The oesophagus is not examined.

We want to emphasize that congenital atresia of the oesophagus probably has an incidence comparable to that of congenital heart disease. Unlike the latter condition, no infant can survive without the prompt aid of the surgeon. Early diagnosis is essential, and if this is to be achieved it is imperative that all concerned with the care of infants during the first few days of life should be aware of the condition and understand when its presence should be suspected.

Pathology

In most cases the anatomical abnormality conforms to the pattern described by Vogt (1929) as Type 3 (b). There is a complete and considerable gap in the intrathoracic oesophagus; the upper segment ends blindly at the level of the superior thoracic inlet, is dilated, and is often densely adherent to the posterior wall of the trachea. The lower segment is narrow and poorly developed, and opens into the posterior wall of the trachea by a vertical slit just above the bifurcation. Rarely, the lower segment is deficient or entirely absent, and there is no tracheo-oesophageal fistula (Vogt Type 2). The extent of the defect in the viscus varies from a thin mucosal obstructing web to complete absence. The position of the tracheo-oesophageal fistula is also variable, and may involve the upper segment or, occasionally, both segments. Cases of tracheo-oesophageal fistula without atresia have been described.

Other congenital abnormalities may be present, but these are rarely incompatible with life. In our own cases the commonest coexisting abnormality has been multiple accessory auricles.

Clinical Manifestations

Most articles published on this condition give rather inadequate descriptions of the clinical manifestations and describe as the typical symptom attacks of cyanosis and choking on attempting to feed. We venture to suggest that this is comparable to describing faecal vomiting as the typical symptom of intestinal obstruction. Feeding these infants is bound to lead rapidly to inhalation pneumonia, and we consider that it is most desirable, and often possible, to recognize the condition before any feeding is attempted. Such recognition before feeding would be achieved more often if midwives and nurses were aware of the condition.

A characteristic feature in most cases is that these infants bring up froth. This has not received adequate recognition in the literature. Many infants will produce some bubbly mucus for a few hours after birth. In contrast the infant with oesophageal atresia brings up a froth comprised of rather smaller bubbles, and this continues or increases. Occasionally the froth is bile-stained. Any infant that is bringing up frothy mucus 24 hours after birth should be investigated for possible oesophageal atresia. Furthermore, no feed should be given until this condition has been excluded by passage of a catheter into the stomach.

Respiratory distress and signs of atelectasis may present themselves before a feed is given. The infant's condition may then be attributed to the atelectasis, which is thought to be an explanation for the subsequent developments. Any infant that is reasonably mature and for no adequate reason presents signs of atelectasis should have a catheter passed into the stomach to exclude possible oesophageal atresia.

A further important sign of the condition is a distended and tympanitic abdomen; the distension, moreover, tends to increase whenever the infant cries or strains. In most cases a lower oesophageal segment is present and communicates with the trachea through a fistula situated just above the bifurcation. Any rise in the intrathoracic pressure forces air through the fistula into the lower oesophagus and thence into the stomach. In the rare case of complete atresia, in which no tracheo-oesophageal fistula is present, the abdomen is dull and no gas can be demonstrated in the intestines on x-ray examination.

In every case the infant must be carefully examined for other congenital abnormalities.

Diagnosis

Once suspected, the diagnosis can be quickly and easily confirmed by passing an adult-size rubber catheter into the upper oesophagus. An obstruction is encountered 3 to 3½ in. (7.5 to 8.8 cm.) from the gums. If a thin catheter is passed it may coil up in the blind oesophageal pouch and give the impression that it is passing into the stomach. If an obstruction is suspected all feeds by mouth are withheld, and 15,000 units of penicillin are given by injection immediately, and repeated three-hourly. Survival of the infant is dependent upon early diagnosis, early admission to hospital, and early operation before the lethal complications of the condition have supervened.

A trained nurse armed with a catheter and some means of applying suction—a rubber-bulb Dakin syringe is probably the best, as it can be used with one hand—should accompany the infant to hospital in the ambulance, so that the pharynx can be kept clear of mucus.

On admission to hospital penicillin administration is continued, and mucus is aspirated from the pharynx as quickly as it accumulates. If the lungs are wet and the infant cannot be induced to cough by passing the aspirating catheter down to the epiglottis, postural drainage is employed by placing the infant in the face-down head-low position and gently slapping it on the back.

As the emphasis is on quick diagnosis and early operation to restore bowel continuity, it is questionable whether any time should be devoted to attempts at restoring fluid balance by giving subcutaneous salines, unless the infant is remarkably dehydrated. In our experience this is unusual in the first three days of life.

Without delay an antero-posterior film of the chest and abdomen is taken to reveal the extent of the pulmonary atelectasis and to confirm the presence of gas in the intestine. If no gas is present the inference is that there is no tracheo-oesophageal fistula, and in all probability the lower segment is deficient or absent. In these circumstances immediate restoration of bowel continuity is probably impossible and the surgical treatment has to be modified. The catheter is again passed into the upper oesophagus, and 0.5 ml. of iodized oil is injected and its progress viewed under the fluorescent screen. It is unnecessary and dangerous to inject larger quantities. Barium must never be used owing to the risk of its entry into the lungs. After antero-posterior and lateral radiographs have been taken, the iodized oil is immediately aspirated again.

The radiological confirmation of the diagnosis by the method outlined should be undertaken only in the unit where surgical treatment can follow immediately. It cannot be stressed too often that this condition is an acute surgical emergency, and any step that may delay operation should be avoided; this applies especially to the repetition of diagnostic procedures in the various hospitals through

which the infant may pass before reaching the operating theatre.

No case is too hopeless for operation, but we have reason to believe that some cases are never referred to the surgeon, "because they appear moribund." The worse the condition of the infant the greater the indication for immediate action.

Treatment

Chemotherapy, pharyngeal aspiration, and postural drainage are continued while the above investigations are being carried out. A slow-drip blood transfusion is begun and an injection of atropine given. The infant's colour and general condition will probably have improved since admission as a result of the removal of secretions from the air passages.

The success of surgical treatment depends to a large extent on the skill of the anaesthetist, who should preferably have special experience of both thoracic surgery and anaesthesia in infants.

The technique of the operation performed in this unit differs in detail from the procedure normally adopted. Under intratracheal ether anaesthesia the fifth rib on the right side is resected subperiosteally and the right pleural cavity is widely opened. The mediastinal pleura is incised, the azygos vein is ligated and divided, and the upper and lower oesophageal segments are identified and dissected from the surrounding mediastinal structures. The upper segment may be densely adherent to the posterior wall of the trachea. The lower segment is divided close to the trachea and the fistula closed. The next step is of great importance: the upper end of the lower oesophageal segment derives some or all of its blood supply from the trachea, and after closure of the fistula cyanosis of the cut end of the oesophagus is usually present. Even though it increases the gap between the two oesophageal segments and renders the subsequent anastomosis more difficult, the cyanotic tissue must be trimmed back until free bleeding from the cut edge is seen. Omission of this step was probably responsible for the breakdown of the anastomosis and the death of three infants in this series.

The blind upper segment is opened, drawn down to the shortened lower segment, and an end-to-end anastomosis performed with one row of interrupted 45-gauge stainless-steel-wire sutures. The mediastinal pleura is not sutured. The lung is re-expanded by the anaesthetist and the chest closed without drainage. During the operation 200 to 300 ml. of blood is given and the drip continued with N/5 saline for the next 12 hours. The infant is placed in an oxygen tent. The pharynx is aspirated frequently to remove excess mucus and to stimulate the infant to cough.

No gastrostomy or jejunostomy is performed. Feeding by mouth begins 24 hours after operation, and $\frac{1}{2}$ -oz. (14-ml.) feeds of sterile water are given every two hours.

In those rare cases in which no tracheo-oesophageal fistula is present and the lower segment is deficient the operative technique is modified. The blind upper segment is brought out to the surface on the left side of the neck and is opened to allow buccal secretions to escape, to prevent their aspiration into the lungs. The deficient lower oesophageal segment is dissected free from the mediastinum and pushed down into the peritoneal cavity; the oesophageal diaphragmatic hiatus is then closed. The abdomen is opened, and, after freeing the upper half of the stomach by division of the left gastric artery and gastro-splenic omentum, the lower stump of the oesophagus is brought to the surface as a gastrostomy. An immediate cervical oesophago-gastric anastomosis is not attempted, but the procedure is deferred till a later date.

Results of Treatment

The many surgeons in this country now interested in this problem almost certainly have a few successes to their credit, and the time has come for the pooling of information regarding not only the survivors but the failures as well, to stimulate physicians and midwives to consider the diagnosis earlier and to take the necessary steps to have it confirmed.

Ten cases have been treated surgically in this unit. Of these patients five are alive and well and five died after operation. There have been two deaths in the last seven cases. In all instances a right transpleural thoracotomy was performed under intratracheal ether anaesthesia; in nine the fistula was closed and bowel continuity restored by an end-to-end anastomosis; in the remaining case no anastomosis was possible, owing to the absence of the lower oesophageal segment, and the infant is thriving on gastrostomy feeds pending a cervical oesophago-gastric anastomosis at a later date. No late complications have been encountered in the survivors.

A brief review of the fatal cases is instructive. One infant, in whom the diagnosis was not made till the fifth day of life, when bilateral bronchopneumonia was already present, died 12 hours after the operation from the lung infection. Another patient, a puny premature infant of 4 lb. (1.8 kg.), 2 days old and almost moribund on admission, died 10 hours after operation from extensive pulmonary atelectasis, which, after recovery from anaesthesia, developed owing to the infant's inability to cough. This infant might have been saved by bronchoscopy.

The three remaining patients all died of infection resulting directly from a leak at or near the site of the anastomosis. In none of these three was the blood supply to the lower segment safeguarded by trimming back the cyanotic upper end. In the light of our more recent experience it is not unreasonable to assume that these three might well have survived if this most important factor had received due consideration.

Case Records

Case 1.—A male infant 5 days old was admitted on October 18, 1946. Since birth there had been regurgitation, frothing, and cyanosis. His general condition was very poor, with evidence of bilateral bronchopneumonia. Gas was present in the bowel. Operation was carried out immediately without blood transfusion. The fistula was closed and an end-to-end anastomosis done. He was dyspnoeic and cyanosed for a considerable time during induction of anaesthesia and died 12 hours after operation from bronchopneumonia.

Case 2.—A male infant 5 days old was admitted on June 28, 1948, with a similar history. His general condition was poor; the lungs were very wet; the right upper lobe was collapsed; and the abdomen was distended with gas. Immediate operation was performed, with blood transfusion. The fistula was closed and end-to-end anastomosis done without trimming back the ischaemic lower segment. Evidence of a leak at the anastomosis appeared two days after operation. Gastrostomy and drainage of right pleura by intercostal catheter were carried out. He died on the eighteenth post-operative day with bronchopneumonia, undrained loculated basal empyema, oesophago-pleural fistula, patent ductus, and patent foramen ovale.

Case 3.—A male infant 4 days old was admitted on December 1, 1948. He had had cyanosis and regurgitation since birth and his general condition was poor. The right middle lobe was collapsed, and gas was present in the bowel. Blood transfusion and immediate operation were performed, with closure of the fistula and end-to-end anastomosis. The infant died on the fifth post-operative day with tension pyopneumothorax due to a leak at the anastomosis. The ischaemic lower segment of the oesophagus was not trimmed back in this case.

Case 4.—A male infant aged 2 days, admitted on December 18, 1948. No feeds had been given owing to frothing since birth. The right upper lobe was collapsed and the abdomen distended with gas. His general condition was fairly good. Blood transfusion and immediate operation were done; the fistula was closed and end-to-end anastomosis performed after resecting the upper centimetre of the lower segment. Convalescence was uneventful. He was fed by mouth from the second post-operative day. A post-operative barium swallow showed a well-functioning anastomosis.

Case 5.—A male infant 3 days old was admitted on April 24, 1949, with a characteristic history. He was very dehydrated, his general condition was poor, and he was passing no urine. The right upper lobe was collapsed and the abdomen distended. Blood transfusion and operation were carried out, the fistula was closed, and end-to-end anastomosis performed with great difficulty, as the upper segment was very short and only just reached the apex of the chest. The lower segment was cyanosed, but had it been resected the gap could not have been bridged. There was evidence of a leak on the fifth post-operative day; the empyema was drained and gastroscopy performed. He died on the ninth post-operative day from suppurative pericarditis.

Case 6.—A male infant 2 days old was admitted on August 29, 1949. No feeds had been given on the first day owing to frothing. On the second day two feeds were given and both were regurgitated; cyanosis was present after the second. His general condition was good. The lungs were dry and there was no gas in the intestines. Blood transfusion and operation were performed: no fistula was present and no anastomosis was possible, as the lower segment was deficient and extended only 2 cm. above the diaphragm. The chest was closed and cervical oesophagostomy and gastrostomy were performed.

Convalescence was uneventful. The infant is now thriving on gastrostomy feeds; for restoration of bowel continuity later.

Case 7.—A female infant 2 days old was admitted on September 18, 1949. She frothed copiously two hours after delivery and her lungs were very wet. All feeds were returned, but there was no cyanosis. The right upper lobe was collapsed, and the bowel contained gas. Blood transfusion and operation were performed, the fistula was closed, and end-to-end anastomosis made. Convalescence was uneventful. Mouth-feeding began on the second post-operative day. The infant is now progressing normally.

Case 8 (Figs. 1 and 2).—A male infant 3 days old was admitted on October 2, 1949. Frothing, regurgitation, and cyanosis had been present since birth. The diagnosis was missed at one hospital owing to the use of a fine catheter, which coiled up in the oesophagus. The lungs were wet, and the abdomen distended with gas. Blood transfusion and operation were performed; the fistula was closed and end-to-end anastomosis performed with difficulty, as the upper segment was short and the gap to be bridged was formidable; nevertheless the lower segment was trimmed back and a satisfactory anastomosis finally achieved. Convalescence was normal. Mouth-feeding was started on the second post-operative day. The infant is now well and is feeding normally.

Case 9.—A female infant, admitted when 7 days old, had vomited every feed since birth. There had been frequent attacks of cyanosis, and frothing was continuous. She was very dehydrated, but the lungs were wet. Admission to hospital had been delayed "because the infant appeared to be moribund." The abdomen was distended. The birth weight was 6 lb. (2.7 kg.), and at the time of operation was 3½ lb. (1.6 kg.). Blood transfusion and operation were performed, with closure of the fistula and end-to-end anastomosis after

FIG. 1.—Case 8. Pre-operative film showing very short upper segment outlined with lipiodol, and pressure of gas in intestines.

FIG. 2.—Case 8. Barium swallow five weeks after operation.

trimming back the lower segment. Mouth-feeding began on the second post-operative day, and convalescence was uneventful.

Case 10.—A female infant was admitted on February 5, 1950, when 2 days old. Pregnancy had been terminated at 38 weeks owing to severe pre-eclamptic toxæmia. Birth weight: 4 lb. 11 oz. (2.1 kg.); on admission 4 lb. 4 oz. (1.9 kg.). The lungs were wet; there was no cough reflex; and she was cyanosed and frothing. The case had been diagnosed elsewhere as "atelectasis of the left lower lobe," and a tracheal catheter had been passed for aspiration. Mucus aspirated from the pharynx was blood-stained. Blood transfusion and operation were performed; the fistula was closed and end-to-end anastomosis done after trimming back the lower segment. Her post-operative condition was satisfactory at first, but the cough reflex never returned, and she died 12 hours later with atelectasis of both lungs. Both bronchi were full of blood clot and mucus.

Conclusions

Congenital atresia of the oesophagus is commoner than is generally realized, the incidence probably being at least 1 in 800 births. Cases are missed clinically or at necropsy because they are considered to have developed pneumonia or to have atelectasis.

Diagnosis is easy once the condition is suspected. An infant that brings up an undue amount of mucus, particularly as a fine froth, for several hours after birth should be suspected of atresia, and such an infant *should not be fed by mouth until the condition has been excluded*. Diagnosis can easily be confirmed by passage of a medium-sized rubber catheter.

Operation holds out good prospects of cure if these cases are diagnosed early and operated upon promptly. Operation is hardly worth attempting unless there is available an anaesthetist with special experience in connexion with thoracic surgery, and preferably one who has made a special study of anaesthesia in infancy.

Ten cases treated by operation are recorded, five of whom have survived.

Continual aspiration of mucus from the mouth and pharynx, both before and after operation, is necessary.

The transpleural approach has been used in all five successful cases.

Closure of the tracheo-oesophageal fistula and restoration of bowel continuity by the simplest form of one-layer end-to-end anastomosis is the operation of choice. Attention to the blood supply of the lower segment should reduce considerably the risk of a breakdown of the anastomosis and its attendant disasters.

Feeding by mouth can be resumed 24 hours after operation, or earlier, and a gastrostomy appears to be unnecessary in the uncomplicated case.

Cases 3 and 7 were operated on by Mr. J. L. Griffith, second surgeon to the South-west Regional Thoracic Unit.

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Revised salary scales have been agreed for senior nursing staff in general and fever hospitals and sanatoria. The new scales are part of the general review of nurses' salaries which has been proceeding for some time, and they have retrospective effect from February 1, 1949. The new scales cover all senior staff in these hospitals except tutorial grades, which are now being considered by the Nurses and Midwives Whitley Council. The scales for senior staff in mental and maternity hospitals are also under consideration.

REVIEW OF ONE YEAR'S WORK IN WATFORD PREGNANCY DIAGNOSTIC CENTRE

BY

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The Watford Pregnancy Diagnosis Laboratory at Shrodells Hospital, Willow Lane, Watford, was set up in 1949, and was equipped to undertake the Hogben test for pregnancy. This particular test was chosen because it is more reliable, more economical, and more easily adapted for routine work than any other method.

The main requirement for reliable results by the Hogben method is that the test animals (*Xenopus laevis*) are in good condition before being used. The routine followed at Watford is almost identical to that published by Landgrebe and Hobson (1949). When the animals are thought to be suitable they are first tested by the administration of 70 i.u. of chorionic gonadotropin. Only those which respond are used for pregnancy diagnosis. For this purpose a dry stable extract of chorionic gonadotropin was made by a modification of the Katzman and Doisy method (1931).

Preparation of Extract of Chorionic Gonadotropin

All urines yielding a positive Hogben reaction are pooled and filtered the day after receipt. To every litre of urine (A) (acidified pH 4.5) 50 ml. of saturated benzoic acid in acetone is added by volumetric pipette with a stirring movement. This mixture is allowed to stand in the refrigerator overnight before the supernatant fluid is decanted into another beaker (B). The dry deposit is collected on a Buchner funnel, scraped from the filter paper, and stored under acetone in the refrigerator. Fluid in beaker B is again processed as the urine (A). The dried deposits are pooled—30 litres of urine yielding from 1.5 to 6 g. of powder.

The powder is extracted with three consecutive amounts of 100 ml. of water. To this slightly acid extract (C) are added 3 volumes of 95% alcohol and 1 volume of ether (diethyl ether); it is then left in the refrigerator for 18 hours. After decanting most of the alcohol and ether the remaining extract (C) is filtered on a small Buchner funnel, washed three times with acetone, dried quickly in warm air, placed in ampoules, sealed off, and stored in the refrigerator.

Before attempting the biological standardization, one can estimate the probable amount of chorionic gonadotropin per mg., assuming that the original pooled urine contained 20 i.u. per ml. (It is usual to extract about 80% of the active material.)

This powder is standardized by comparison with the international standard powder, using *Xenopus laevis* as test animal (Landgrebe, 1948), and its potency expressed in international units per mg. The potency varies from 100 to 400 i.u. per mg.

Number of Tests Undertaken in 1949.—Once the stock of *Xenopus laevis* reached 200 tested animals, urines from Hertfordshire were accepted. Specimens from London and the South of England were taken as the number of tested animals increased. In February, 41 specimens were received, while the peak number handled was 522 in October; 3,724 tests were performed throughout the year.