Rather a massive superinfection, biological or mechanical changes may have an effect on the inflammation and the setting up of new foci. I do not perceive a difference in the pathogenesis of those foci, whether they arise through hæmoptysis or perifocal inflammations or come into existence partly through aspiration in a constitution whose allergy is temporarily changed from the above-mentioned causes. For instance, in a patient with cavity we may see dissemination—though more rarely—even if there has been no blood spitting. It does not seem to me that the allergy question is sufficiently cleared up, but in the working out of this paper I was forced to adopt this theory for want of a better. It is still the most commonly accepted explanation as the origin of the tuberculous lesion. *In passing I do not consider that Finke, Karpovsky and Verdina's* finding of a capsulated diplococcus sufficiently explains the origin of the pneumonia in patients with hæmorrhage.

Among our cases no new lesion came into existence in seven. In one of these aggravation of the cavity lesion was noticeable and this explained the high fever which developed. Among the others in one case there was a rise of temperature to 39° C. and in another to 38° C., lasting respectively *from one to four days.* This shows the slighter degree of readiness to exudative inflammation. In comparison fresh lesions, as we mentioned, were all alike accompanied by a rise of temperature to over 39° C.

These facts may furnish evidence not only regarding the frequency of complications after hæmoptysis, the significance of the allergy and the arising of the subsequent lesions, but have elucidated *a practical question of* great importance. As is well known, treatment for hæmoptysis formerly consisted in keeping the patient at complete rest in a nearly corpse-like position. Then came the view that there was no necessity for this and that we should even abstain from giving morphia to obtain the cessation of the cough, lest we should assist the production of the aspiration foci. Rest, however, is the sovereign remedy for perifocal inflammation with exudation. (This is *always emphasised also in communications* dealing with infra-clavicular infiltrations.) Rest is more desirable as regards the aspiration, for in the more deeply breathing, coughing lung the blood is more liable to disperse the contents of the cavity together with the tubercle bacilli. Indeed Fleischer by means of X-ray examinations after lipiodol injections has shown how the contents of the bronchi, after coughing, reach the more distal parts of the lung.

These *data, therefore,* are in favour of our keeping the hæmoptysis patient at rest and only beginning to allow slight movement when we may judge by cautious physical examination that there is not a large quantity of blood in his air passages, and that no exudative changes have appeared. This latter we can also deduce in the greater number of cases by the rise of temperature to over 39° C. The physician, *if he takes all these* things into account, may find the right way of obtaining the necessary rest for the patient and allaying his cough.

SUMMARY.

(1) The majority of our patients who had repeated attacks of hæmoptysis were submitted to X-ray examination. They showed cavities and positive sputum.

(2) During the bleeding more than half (showing progression) had a temperature ri lasted from three to twenty-four days.

(3) Exudative alterations, a perifocal infl in most of the cases. Miliary tuberculosis s occurred in one case.

(4) The exudation was in most cases a general therefore was not unfavourable.

(5) The old lesion remained unchanged.

(6) The new lesion may be tentatively explained as the result of the development of secondary allergy and aspiration. This is a twofold preliminary condition for the production of the inflammation, in other words, the soil becomes suitable for the perifocal inflammation or for the settlement of a new infection.

(7) In considering whether rest or moveme us in a case of hæmoptysis, the dangers of exudative he dispersion through aspiration when moving or g factors in favour of rest.

PLAINTIFF'S EXHIBIT SAYS

TWO CASES OF SQUAMOUS CARCINOMA OF THE LUNG OCCURRING IN ASBESTOSIS.

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Bridge and Henry [1] have proposed that cancer, in order to be classified as of industrial origin, must fulfil the following two conditions: (1) That the incidence rate in the occupation under review should exceed that in the general population, to a significant extent, and (2) that in the occupation concerned there should be sufficient association of the worker with a substance proved experimentally to have carcinogenic properties. Although suggestions have been made from time to time, notably in the case of the Schneeberg miners of Germany, (Rostoski [2], Schmorl [3], and again recently by Dible [4]), that carcinoma of the lung is liable to supervene upon pneumonokoniosis of long standing, the precise interrelation of the two diseases is still an open question. It seemed worth while, therefore, to record these two cases, not in any attempt to make out a case for an ætiological association of these two diseases, but in order to emphasise certain histological points in which the one disease appears to bear upon the other.

With regard to the classification of primary lung carcinoma the view is held by Klotz [5], Weller [6] and others, that the same pulmonary neoplasm may show squamous cells in one case, cuboidal in another and polygonal in another. Without at this stage attempting a definition, the two cases here described were regarded as squamous because the squamous cell was predominant, and prickle cells, keratinisation and cell nests could be identified.

The two cases were women workers. One (F. A. D.) survived nine

PLATE II.

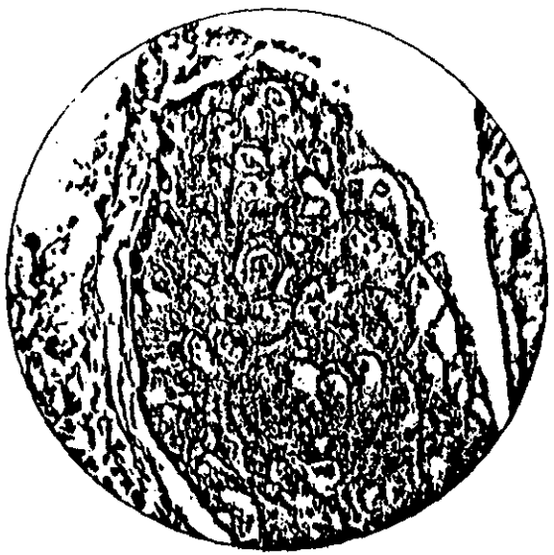

FIG. 3 (× 600).—Photomicrograph of squamous (prickle) carcinoma cells.



FIG. 4 (× 150).—Photomicrograph of cell nests.

small neoplastic mass then began to show vacuolation which became so marked in the centre that a structureless remnant of degenerating cells was all that could be identified. This was followed by keratinisation and the neoplastic mass became an external ring of keratinised squamous epithelial cells surrounding a clear space which was empty except for a broken down nucleus here and there, and cellular debris. Finally a cell nest was formed of concentric layers of keratinised flattened cells with elongated nuclei (fig. 4). In the asbestosis lung the unwary might at first sight mistake this for a minute silicotic whorl, so regularly were the concentric layers arranged.

When these elongated processes of carcinoma cells were traced through serial sections, it was noted that they were in reality long columns of carcinomatous material passing along the walls of bronchioles or lymphatics, or penetrating between the collagenous fibres of the asbestosis lesion. In one place the growth was narrowed down to a column two or three cells thick, in another it expanded into a broad band of squamous cells, and in yet a third it branched out into two or more columns (see especially numbers 39, 43 and 45 in the series, fig. 5), probably following the branching of the bronchioles, and finally it spread out into broad columns, possibly as the respiratory bronchioles opened out into alveoli. Here and there these columns appeared to be hollow as though the centre portions had been degenerated and destroyed. Fig. 5 shows a portion of serial drawings illustrating these details. Over 50 sections were cut in long serial ribbons. It is not possible to reproduce the whole series, but a sufficient number have been selected to illustrate the process. The serial number of each is given.

The diminution and frequent disappearance of carbon pigment, asbestos fibres and asbestosis bodies from those portions of the lung which were invaded by growth is also noteworthy. This seemed to be due to compression, and a thin layer of denser pigment than usual was occasionally to be seen immediately outside the advancing edge of the tumour, the growth as it were pushing the carbon pigment before it.

The individual squamous carcinoma cell varied markedly in appearance in different positions of the neoplasm. Along the growing edge the young cell had a typical squamous appearance with occasional short pseudopodium-like prolongations and a definite prickle-cell arrangement along the margin where the cell was contiguous with its fellow. The nucleus was rounded and mitotic figures were occasionally seen. In the majority of cases the nuclear network was thin, and only in its outer parts was the suggestion of a network at all well defined. Situated at one side of the centre of the nucleus was a large round nucleolus with homogeneous nucleoplasm, often more acidophilic in reaction than the rest of the nucleus. Its relation to the nuclear network was by no means easy to define. It was, however, characteristically present in the majority of the nuclei and frequently gave the impression of not being a nucleolus at all, but some form of inclusion body.

As the cell advanced in age marked vacuolation of the cytoplasm took place; it became markedly acidophilic and finally shrunken, whilst the nucleus appeared almost as though it were suspended by thin bridges of cytoplasm in the midst of an empty cell. The nucleus then assumed a

years after an eight years' exposure to asbestos dust as a spinner; the other (M. M. S.) lived for fifteen years after two short periods of six months and thirteen months' exposure in the mattress and opening departments of the factory. In both cases the occupational history went back to the war years. The malignant lesions of the lung were, in each case, very small and were not recognised during life.

Autopsy Records.

Case 1.—F. A. D., female, aged 35. Typical pulmonary asbestosis of moderate degree of severity with large ante-mortem clot in right heart, splenic infarct and meningeal haemorrhage. Deeply embedded in the base of the right upper lobe of the lung was a soft, round, white, circumscribed growth, about the size of a small walnut. Sections of the lung showed extensions of the growth as far as the apex and in the thickened pleura. No signs of growth elsewhere.

Case 2.—M. M. S., female, aged 71. Typical pulmonary asbestosis of moderate degree of severity in upper, and fairly advanced in lower lobes, with ascites and thrombosis of left femoral vein. In right lower lobe were several small, soft, necrotic, greyish, irregular nodules of growth breaking down here and there into small cavities.

Mediastinal glands showed small deposits of fibro-caseous tubercle, but no tuberculous lesions were found in lungs. No signs of growth elsewhere.

The malignant lesion in the second case seemed to resemble that described by Lynch and Smith [7] in a similar case.

The chief points noted were (1) that in each case the growth was small and circumscribed with no extension to important structures likely to hasten death; (2) no secondary deposits; and (3) the asbestosis was fairly advanced and of long standing.

Histological Examination.

In each case the neoplasm consisted of a collection of numberless minute portions of growth lying between thick strands of collagenous fibres such as are commonly seen in advanced asbestosis. In some areas the advance of the tumour seemed to have been definitely checked by the dense fibrosis (fig. 1), the neoplastic elements being necrosed and almost structureless. In Case 1 the neoplasm was found on section to contain in the centre a small bronchus plugged with growth (fig. 2). In transverse section the plug was seen to consist of a central core of degenerated neoplastic cells surrounded by collagenous fibres with strands of growth cells distributed irregularly between the fibres, the whole being surrounded by the elastic lamina of the bronchial wall.

On examining the growing edge of the tumour its intimate relationship to the bronchial tree was evident. The advancing outposts of groups of neoplastic cells were growing from the walls of the bronchiole or lying free in the lumen or in the alveoli, often with desquamated bronchial epithelial cells and macrophages surrounding the growth cells. These outposts of growth had a characteristic appearance. They consisted of irregular elongated processes of protoplasm containing nuclei, but with little or no demarcation of cell envelope. When stained with Heidenhain's haematoxylin, cell outlines were visible here and there, with occasional intercellular bridges indicating a prickle cell. As growth proceeded typical squamous-looking cells could be identified (fig. 3). The

PLATE I.

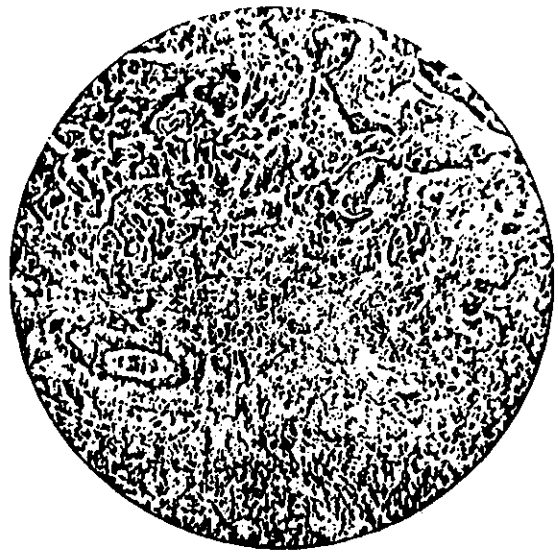

Fig. 1 (× 150).—Photomicrograph of lung, upper half showing squamous carcinoma, the lower asbestosis.

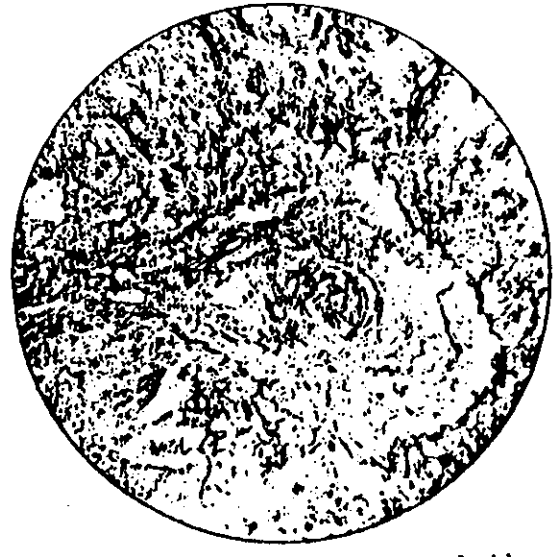

Fig. 2 (× 10).—Photomicrograph of small bronchus plugged with growth. The elastic layer of the bronchial wall is stained with Weigert's stain to mark the limits of the bronchial wall.

To illustrate article, "Two Cases of Squamous Carcinoma of the Lung Occurring in Asbestosis," by S. Rodhouse Gloyne, M.D., D.P.H.

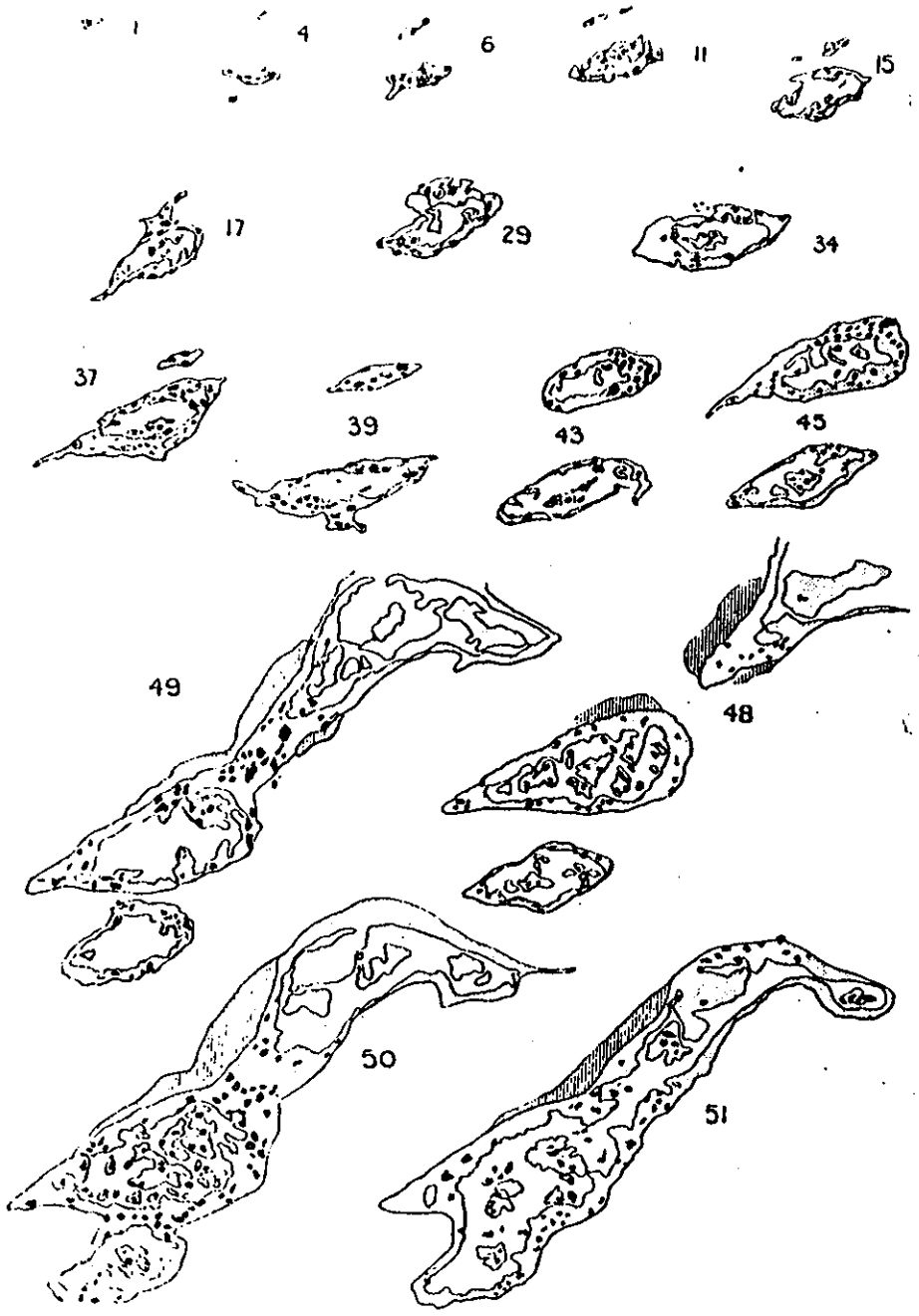

FIG. 5.—Selected portions of serial sections of prolongations of growth, drawn with camera lucida.

elongated or signet-ring appearance and came to lie in a peripheral position just inside the cell envelope. At this stage the cell bore a close resemblance to the "signet ring" cell frequently found in pleural effusions accompanying malignant disease. Finally, keratinisation began to appear in the cell envelope. The cell collapsed to form an elongated plate of keratinised protoplasm with an elongated nucleus along one margin of the plate, and a cell nest resulted from a concentric grouping of such contiguous cells.

Discussion and Summary.

(1) The carcinoma appeared to arise in the wall of a small bronchus and to grow into and extend along the lumen.

(2) Serial sections suggested that the growth was a continuous prolongation rather than a series of isolated units, though it was not possible to indicate a definite starting point. These prolongations were hollow in places, showing a degenerating layer of cells around a central empty space and an external ring of keratinised squamous cells.

(3) The growth was in a portion of lung in which the asbestosis was fairly advanced. This was particularly clearly marked in Case 2.

(4) The line of march of this growth was to a marked extent limited by the fibrosis. The advancing prolongations of the neoplasm insinuated themselves between the collagenous fibres of the pneumonokoniosis. Here and there this appeared to result in compression and degeneration of the growth but, on the balance, the growth got the upper hand and slowly progressed.

(5) In both cases death had occurred before the tumour had attained a size capable of affecting vital parts. It may possibly be of some significance that secondary deposits or even extension to mediastinal glands had not occurred.

(6) Pigment, asbestos fibres and asbestosis bodies were pushed aside by the advancing growth.

(7) Weller has described a form of scirrhous carcinoma of lung with slender columns and cords of cells running through a very dense hyaline stroma. In two of his cases chronic fibroid pneumonia is recorded as having been present, but apparently the scirrhous nature of the growth was evident in areas other than the fibroid pneumonia. In the two cases here described the true squamous nature of the tumour was, however, evident, from the presence of prickle cells, keratinisation and cell nests.

(8) At this point an interesting question arises. The asbestosis, though fairly advanced, was not sufficiently advanced to cause death. The neoplasms also were small and had involved no vital parts (a small meningeal hæmorrhage having terminated life in the first case). Indeed, compared with the squamous carcinoma of the lung in general, as it reaches the post-mortem room, the growths were unusually small. A tentative suggestion may be made that in asbestosis a small tumour turns the scale, just as bronchitis with early bronchopneumonia will do, probably as a result of toxæmia. The writer has noted a similar occurrence in a case of oat-cell carcinoma with asbestosis.

[The writer is greatly indebted to Miss P. E. Double for the drawings of serial sections and to Mr. A. W. Smart for the photomicrographs and much technical assistance.]

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THE PREVENTION OF TUBERCULOSIS IN CHILDHOOD BY METHODS OF SEPARATION.

By G. GREGORY KAYNE, M.D., M.R.C.P.Lond.

(*Continued from Vol. xvi, No. 12, p. 560.*)

Section II.

BELGIUM.

(1) HISTORICAL.

The tuberculosis problem in Belgium was until 1929 handled by three separate, originally private, organisations, each concerning itself with a different aspect of the problem—*prophylaxis and dispensaries, sanatoria,* and the separation of contacts. In 1929 these three organisations amalgamated to form the *Œuvre Nationale Belge de Défense contre la Tuberculose*, in many respects parallel to the Welsh National Memorial Association, which also directs the tuberculosis work from all aspects over a large *region*. In Belgium, however, the three organisations to some extent still act individually as regards their objects.

The *Œuvre de Préservation de l'Enfance contre la Tuberculose* was founded in 1911. At first Grancher's formula was adopted, and the centre was created in the country where 30 children were boarded out amongst peasant families. At the outbreak of the War, in 1914, it was however found necessary to close this centre and bring the children back to Brussels where they were provisionally placed in a hospital and subsequently in groups in boarding-schools. The number of children admitted increased considerably during the War, and the younger ones were therefore placed in an institution specially converted for the purpose from a boarding-school in Brussels. Thus during the War "collective" or institutional boarding out took the place of "familial placing." After the Armistice in 1918 a centre amongst peasant families was again created at Hainaut in the south of Belgium. It developed rapidly so that soon 150 children were being supervised. A few of these children still go to school there at the present time.

Up till 1919 only children from the age of 8 years were admitted. In that year, however, the *École Edith Cavell-Marie Depage* in Brussels decided to allow the admission of a certain number of infant home-contacts to its *pouponnière*. The Association, therefore, undertook to send there infants separated immediately after birth. At first 12 cots were placed at the disposal of the Association, but this number was increased to 25 in 1928. In 1924, the generosity of a co-operative society enabled a special institution for older children to be founded at Breedne-sur-mer, near Ostend, about 60 miles south-west of Brussels. In 1925 the Association purchased at Flobecq (south-west Belgium), a pavilion to which the children immediately after leaving the *pouponnière* could be admitted. Finally in 1932 a private donation resulted in the foundation of a Home at Arc-Ainières at Hainaut. The last two institutions are both situated about 60 miles south-east of Brussels.

(2) REASONS FOR THE ADOPTION OF INSTITUTIONAL [illegible]

In Belgium at the present time the children from tuberculous households are no longer boarded out with families and both infants and older children are admitted to the institutions indicated above. The reasons for this change in policy given to the writer by Dr. Duthoit, Honorary Secretary of the Association since its foundation, were as follows: (1) The difficulty in finding a sufficient number of families. The experience with the children boarded out in the earlier years of the Association showed that the peasants often became very attached to the foster-child (only one child was placed with each family), and when the child had to leave to return to its own family they refused to take in another. (2) Parents unwilling to allow children to be placed in peasant families. They resented the children being *chez les paysans*, and they considered that the latter undertook the upbringing of the children purely for material gain. (3) On the other hand, the parents liked the children to be at the *pouponnière* and even more so at the institution at Breedne-sur-mer and were much more ready to separate themselves from them under the latter conditions.

The Association finds institutional separation quite satisfactory. The objections usually raised against it have not been found troublesome and there have been no epidemics of any importance. The difference in cost is very slight.

(3) MODE OF ADMISSION.

The head office the Association is situated in Brussels at the *Centre de Santé*, a child-welfare centre consisting of many other well-organised departments. Home-contacts are eligible for admission from birth to the age of 8 years (originally the age limit was 14, but this had to be reduced owing to financial difficulties) and are kept till the contagion at home has disappeared by death or cure. The child must be healthy, but a positive tuberculin reaction without any other evidence of clinical tuberculosis is no contra-indication. Children who suffer from any infirmity or defect likely to cause great inconvenience in the institutions (for example enuresis) are not admitted. Infants are separated at birth in the maternity hospitals in Brussels, where no special arrangements like those existing in Paris are available, but some isolation of the mothers takes place and the infants are brought over to the *pouponnière* within a day or two of their birth after arrangements for their admission have been made through the health visitor of the *Centre de Santé*. All other children requiring admission are first seen by Dr. Duthoit at the *Centre de Santé*. They are generally recommended by a tuberculosis dispensary, the staff of which certify as to contact, the condition of the child and the results of the X-ray and tuberculin tests. These are checked if necessary by Dr. Duthoit. In addition the parents have to bring their *livret de marriage* for the particulars of birth. The child must have been vaccinated and if the tonsils and adenoids require removal the parents are allowed a short period in which to make the necessary arrangements.

If admission is recommended, request is then made to the *Assistance Publique* to pay part of the cost of the upkeep of the child, as the State only allows a very small proportion of the cost in each case. This arrangement has to be made individually for every child. The parents themselves