

studying a foreign language. He asked industrial members whether they could not do more for the science masters at the schools, perhaps by providing some possibilities for research, but certainly by showing a real interest in them. He took the opportunity of thanking industry for making so marked a contribution to the problem of laboratories in the independent schools.

Mr. J. A. Oriel (president of the Institution of Chemical Engineers) maintained that the opportunities for chemical engineers are excellent and that the profession is showing a most vigorous growth. He claimed that Britain needs at least five times as many chemical engineers leaving the various educational establishments as at present, and that the opportunities for new recruits are excellent. The process industries throughout the world are experiencing a period of outstanding growth, and central to their progress lies the chemical engineer. Referring to the petroleum industry, Mr. Oriel instanced the developments in the past thirty-five years, but he believed there was an even brighter future ahead. In Britain, chemical engineers are almost equally divided between research, development, construction and operation. In North America, with its longer period of development in this field, chemical engineers are in administration in a greater proportion than chemists or other engineers.

In reviewing the symposium, Prof. D. M. Newitt (Imperial College of Science and Technology) thought that industrialists were right in placing emphasis on character development rather than on functional efficiency, but he maintained that a period of post-graduate studies was of greater value than indicated by the industrial members. He thought that we should probably change the nature of our training even more rapidly. Present syllabuses tend to be a legacy of the past and could with advantage be given a new look. Chemical engineering science could conveniently be regarded as a link between physical sciences and technology, and he gave a brief outline of proposals on these lines, in which the traditional studies of mechanical and electrical engineers were merged into chemical engineering science.

J. M. COULSON

## WOMEN IN INDUSTRY

WHEN the history of the twentieth century is written, the year 1957 will surely be noted, *inter alia*, as the one when women really began to press their claims for equal career opportunities with men. Their efforts to secure equal social rights through equal educational opportunities has met with considerable success, and, within a few years, they should achieve equal material rewards for equal work. In many activities, and especially in the professions, they have reached positions of eminence and few doors still remain closed to them. In one sphere, however, they have made little progress. This, of course, is the world of industry, and during the past few months the voice of woman has been raised in many parts of the world protesting against the domination of man in industrial and commercial activities. In Britain that voice has been heard at various conferences and courses, while powerful arguments for career emancipation have been propounded in all kinds of journals.

It was appropriate, therefore, for the British Federation of University Women to form a working

party to examine all the opportunities open to girls and women with qualifications in science and technology. Its report\* has now been published and contains details of jobs available to girls and women in industry, the professions, agriculture and the Armed Forces. The compendium has been painstakingly prepared, and, in the section dealing with openings in the professions and Armed Forces, will be invaluable to headmistresses and university authorities, parents and girls in their formative years; details of jobs are accompanied by details of qualifications needed to fill them.

In the sections concerned with opportunities in industry, however—and these are very few in a report of this size—the working party has been less than fair to members of their own sex who wish to take up work in industry. Perhaps it was unfortunate that only one of the working party of twenty-four women appears to have had definite experience in industry and that in a specialist job.

If the working party had included one or two women members with experience of management in industry—the managing director of Boxfoldia would have been an excellent choice—more attention might have been paid to the very real difficulties confronting a girl who is keen on an industrial career. Although there is still considerable male prejudice against the employment of able women in industry, not all men are prejudiced; there are real difficulties and these must be squarely faced if they are to be overcome.

First, women, like men, would have to see that, although it has other functions, industry must make profits or it would cease to be. The comparative security of the past twenty years has led to great emphasis on the 'service' aspects of industry. This is surely right and cannot be over-stressed. But manufacturing industry can never be a service in the same sense as a profession like medicine, and the competitive element cannot be eliminated. Aspiring women, therefore, should be clearly told that, while industry overall has a social purpose, many industrial firms fail every day and many more are likely to do so. They should accept, too, that industry has not settled patterns of promotion like many professions and the Armed Services and that, even to-day, many men in senior positions have little formal education or training; the secrets of success in industry are still far from clear.

It should also be made clear that many of the openings in industry described in the report will lead to important specialist positions in industry but not to senior positions; the latter will still go to those who are able to co-ordinate the work of the specialist. It is surprising that a report of this kind could be prepared without including the word 'management'; that appears to be the case. Women graduates, too, should be warned that in many industrial organizations which employ male graduates, the latter are finding it difficult to make headway against traditional rule-of-thumb methods of management.

The real difficulty, however, which must be overcome before women are accepted in senior positions in industry is the question of marriage and child-bearing. These topics are not mentioned in the report. Yet if a manufacturer is faced with two people for a key appointment, he is unlikely to provide expensive training for one on whom the odds of leaving are much greater than the other. It is little use telling him that this training will not be lost to

\* Opportunities for Girls and Women in Science and Technology. 2s. net.

industry as a whole; he looks at his balance sheet and there may be a loss to him.

Such manufacturers will only take women applicants when there are no suitable male applicants. Fortunately for professional women, that condition has already been reached in many branches of British industry. Women will be accepted because there is no other choice. Women should think carefully, however, before deciding on particular careers in industry. In such careers as general management, personnel management, and industrial medicine, a break for marriage and child-bearing should be no handicap and should enable the middle-aged women to return to industry even more fitted for her job. In rapidly evolving specialist fields, however, where knowledge of chemistry, physics and other natural sciences are involved, she may find it easy to secure a post before marriage but difficult to return to it afterwards.

Women who wish to find employment in industry may find this report disappointing; they should be consoled by the knowledge that industry can no longer do without them.

## EARLY HISTORY OF THE SAUROPSID REPTILES

**I**N palaeontology, as in other branches of science, small things often lead to great and far-reaching results. It is not unexpected, therefore, that Prof. D. M. S. Watson, with his usual searching eye and his vast knowledge of reptilian structure, should develop some significant conclusions from his study of eight small reptilian skulls and associated skeletal materials, contained in a nodule of rock from the *Cisticephalus* zone of the Karroo series of South Africa. These fossil remains, representing the genus *Millerosaurus*, are described in detail in a recent paper\* by Prof. Watson in which he turns to a discussion of the basic classification and the relationships of all the reptiles.

*Millerosaurus*, as Watson shows, is a small fossil reptile with a long body and slender limbs. The skull is basically cotylosaurian, but it has a well-developed lateral temporal fenestra, situated beneath the post-orbital and squamosal bones. A part of the skull roof is covered with bony osteoderms fused to the underlying skull bones, and at the back of the skull the quadrate is characterized by a long ascending process rising to the supratemporal bone. In the area behind these bones is a small stapes, quite comparable to the stapes of a lizard, which in life must have formed a communication between a large tympanic membrane and the fenestra ovalis. The pectoral girdle has a 'screw-shaped' glenoid, and in the hind foot the fifth digit is complete and divergent. The fifth metatarsal is straight—not a hook-shaped bone. Such are a few of the bare facts concerning the osteology of *Millerosaurus*. What are the implications?

In 1916 Goodrich saw a basic dichotomy within all but the most primitive reptiles, the two branches of which he designated the Sauropsida and the Therapsida. Watson upholds this view of reptilian evolution, and he places *Millerosaurus* and its relatives as very important ancestors of sauropsids. In

line with previous work, he believes the ear region to be of particular diagnostic value in the determination of sauropsid and therapsid relationships. Thus *Millerosaurus* is an ancestral sauropsid, in part because it has the type of ear structure briefly described above. (In the therapsids, according to Watson, the tympanic membrane was lost for some time during late Palaeozoic times, and in later forms was re-established as a neomorphic structure, not homologous with the tympanic membrane of the sauropsids. This part of his thesis is disputed by some authorities, notably Vaughan in a recent contribution.)

Because of the important situation of the millerosaurs (as *Millerosaurus* and its near relatives may be designated) in time and in their taxonomic position, this study throws light on many other reptiles and on the whole subject of reptilian classification. Watson believes that the temporal fenestrae are of secondary importance in determining reptilian relationships. He suggests that the millerosaurs, which are essentially cotylosaurs with lateral temporal fenestrae, might well have been ancestral to the prolacertilian reptiles, to the eosuchians and to the great thecodont-archosaur complex; in short, to sauropsids, which comprise the great majority of reptiles through time. He believes that the evolution of the diadectids may represent an entirely separate reptilian development, parallel to the rise of the procolophonid-millerosaur stem, the true base for the sauropsids.

Watson's conclusions are of broad consequence to students of reptilian evolution, and the accumulating mass of evidence would seem to reinforce these ideas. Since the concept of an early dichotomy of evolving reptiles is of such significance to future work in this field it is perhaps unfortunate that Goodrich's term 'Therapsida' is being continued. This word might well be abandoned in favour of some other name that is less apt to get confused in many minds, and particularly in many typewriters and printing presses, with the long-established taxonomic designation 'Therapsida'. Indeed, though not so serious a case, the term Sauropsida bears too strong a resemblance to Sauropoda for complete comfort. Could we not have two new names for the two primary lines of reptilian evolution? EDWIN H. COLBERT

## FILTER FEEDING IN FLAMINGOES

**F**ILTER feeding is very rare among the higher vertebrates—among the mammals it occurs only in the whalebone whales, and among the birds in the Anatidae and in some species of a few other families. It reaches its highest development in the flamingoes, in which it has been investigated by Miss Penelope M. Jenkin, who reports her results in a recent memoir\*.

There are six species of flamingo according to some authorities, or four, one of which is divided into three sub-species, according to others; they are partitioned between three genera. Flamingoes are widely distributed throughout the warmer regions of both Old and New Worlds, and their distribution is determined by the situation of the salt or alkaline lakes where their food occurs in abundance. They thus congregate near the great deserts of the world, often at high altitudes. When Miss Jenkin was working on the

\* *Phil. Trans. Roy. Soc., B*, No. 673, 240, 325 (1957): On *Millerosaurus* and the Early History of the Sauropsid Reptiles. By Prof. D. M. S. Watson. (London: Royal Society, 1957.) 25s.

\* *Phil. Trans. Roy. Soc., B*, No. 674, 240, 401 (1957): The Filter Feeding and Food of Flamingoes (Phoenicopter). By Penelope M. Jenkin. (London, Royal Society, 1957.) 35s. 6d.