To enable the ship to rise or descend during flight there are three parallel horizontal planes on both port and starboard sides, forward and aft. These are comparatively small, pivoted in the centre at each side, with a vertical rod at each corner, and through these all are tilted to the desired angle by wire gear operated from either gondola. For lateral movement there are three groups of vertical rudders, one having four parallel planes above and a similar one below the main structure near to the stern, while abaft of the propeller, in the after gondola, there is a group of three rudders. Rudders, engines, and propellers were worked before the members of the advisory committee at the trials. The committee are to be congratulated, as well as Captain Sueter, who has had charge of the work on behalf of the Admiralty, and also the Vickers Company on the important stage which their unique work for the Navy has now reached.

INFANT AND CHILD MORTALITY.[1]

THE report before us is one of the most important studies of infantile mortality yet produced. Administratively, it will be of immense value, for it constitutes a first guide to the "dark areas" of England. Scientifically, it is also of value, for it brings actual administrative data to bear on a fundamental social question, namely, does the prevention of infant deaths tend to the deterioration of the race? Whatever be the final reply to this question, the work of prevention will certainly proceed as if the question had never been asked, because the impulse towards prevention is itself a fundamental impulse in modern society, and will realise itself against all hindrances.

It is, however, of immense importance to know whether, on the whole, the methods of prevention in this particular field are favourable to the rearing of a sound race or not. Survival of the fittest, however, is no longer to be imaged merely as survival of individuals of a single quality. Rather it is imaged as survival of fit groups, and the concept of the "group-person" is steadily gaining a place, not in biology alone, but also in economics. The preservation of the "group-person" implies that natural selection must be regarded as operating on the group, not on the mere individual considered abstractly. Consequently, it may well happen that, as the preservation of the group is the primary and immediate object of social organisation, the preservation of a certain proportion of relatively weak individuals may be ultimately harmless even on the most stringent interpretation of the Darwinian principle of natural selection. At all events, it is important to have the problem studied in detail, as is the case in this well-loaded document. If it turns out that the preservation of the individual does not, even in a minor degree, impair the fitness of the group, all the better.

It is this important consequence that Dr. Newsholme's investigation, so far as it goes, tends to establish by actual facts. The administrative results we may leave alone. One of the primary intentions of the report was "to determine, on the basis of our national statistics, whether reduction of infant mortality implies any untoward influence on the health of the survivors to later years" (p. 1). The figures of a single year, 1908, are taken and carefully analysed. The counties of high infantile mortality are compared in sufficient detail with the counties of low infantile mortality. Infantile mortality is compared and correlated with the mortality at later ages—age one to two, two to three, three to four, and four to five, and even at age-groups five to ten, ten to fifteen, fifteen to twenty. In this way, data variously presented are obtained for testing the influence that the infantile mortality has on the mortality of the survivors, even up to adult ages.

"This comparison is important, because attempts to reduce infant mortality are regarded by many as an interference with natural selection, which must be inimical to the average health of those surviving. According to this school of thought" (we think Dr. Newsholme too generous, if he is not ironical, in dignifying those somewhat casual theorists by the name of "school"), "efforts to save infant life merely prevent the weeding out of the unfit, and ensure the survival of an excessive proportion of weaklings" (p. 9). The results of the "correlations" are startling, though some of them may equally be come at by general reasoning. However we turn the figures, it remains true that "a high infant death-rate in a given community implies, in general, a high death-rate in the next four years of life, while low death-rates at both age-periods are similarly associated" (p. 13). Thus of the eight administrative counties with highest infant death-rates, the infant death-rate was 139·1 per 1000 births, and the death-rate at age one to five was 69·2, while in the eight administrative counties with lowest infant death-rate, the corresponding figures were 77·9 and 32·6.

This relationship is found also in the comparisons of the individual counties. But the correlations reveal the further fact that at the later ages the same general relation is true. "Speaking generally, it will be seen that the eight counties having a high infant mortality also had a relatively high death-rate of males during each of the four first lustra of life, and the eight counties having a low infant mortality had also a relatively low mortality at ages 0–5 and 5–10, and to a diminishing extent at 10–15 and 15–20" (p. 16). Probably at the later ages other special influences, such as migration, complicate the issue.

The problem of the "selective influence" is analysed and estimated in greater detail in a special section by Mr. Udny Yule, whose general conclusion, from somewhat inadequate data, is "that there is little definite evidence of such selection beyond the second year of life, and that after the third year the environmental influences even of infancy alone appear to preponderate over any possible selective influence" (p. 78). There is no space even to indicate the wealth of fact that goes to the discussion of the causes of infant mortality. The broad conclusion is that no effort should be spared to reduce the mortality of infants and to remove all removable causes of death. Philanthropic impulse is thus reinforced by scientific analysis of the facts. This report will be followed next year by a similar study of infant mortality in the large towns. Dr. Newsholme is to be congratulated on his admirable combination of scientific analysis with practical administration.

[1] Supplement to the Thirty-ninth Annual Report of the Local Government Board, 1909–10. By Dr. Arthur Newsholme, Medical Officer to the Board. (London: Wyman and Sons, Ltd., 1910.) Price 1*s*. 3*d*.

FIXATION OF ATMOSPHERIC NITROGEN.

SINCE the work of Lord Rayleigh in 1894, when he repeated the experiments of Cavendish with improved apparatus and more modern methods, continual progress has been made in connection with the oxidation of atmospheric nitrogen. Rayleigh's experiments, carried out on a large laboratory scale, showed the feasibility of obtaining nitric acid or nitrates from the atmosphere, and, given cheap power and appropriate appliances, the possibility of it being done on a paying commercial scale.

The pioneering work which followed for a long time spelt—commercially—failure. But as first one idea and then another was shown to be unsatisfactory, and had to be discarded, knowledge increased, as is always the case with research, and in 1903 Birkeland and Eyde designed and erected a plant which, at any rate, in part solved the problem. In a lecture delivered before the German Association of Naturalists and Physicians in September last, Prof. J. Zenneck takes up the subject at that stage, and reviews this process and others which have since been devised (Leipzig: S. Hirzel, 1911). The lecture was evidently delivered to a popular audience, because Prof. Zenneck describes and illustrates the processes in a way which will interest and instruct those who may have very little knowledge of chemistry. For example, by means of a model, he showed how in the Notodden process of Birkeland and Eyde the air is driven by means of a compressor through the furnace containing the disc-shaped arc, then how gases are partially cooled and the heat given up is used for the generation of steam and for evaporating the liquors. We believe, indeed, that coal is not required in the works at all for heating purposes. The Notodden plant, however, is so well known that it will be superfluous to describe it further, except to mention that very good diagrams and pictures of the works are included in the printed lecture.

Prof. Zenneck then describes the Pauling process. It is a well-known fact that vigorous blowing will put out the electric arc, consequently it is not an easy matter to blow air through an arc so that the nitrogen may become oxidised without blowing out the arc. In the process of Pauling, air is blown through an arc. The arc, however, is struck between horn-shaped conductors, such as are used as lightning arrestors. The two horns are closest together near the bottom, and it is here that the arc is struck. Owing to the ascending hot air, the arc rises upwards, and is broken once for each period of the alternating current. A new arc, however, is immediately produced again at the bottom, and this goes on continuously. An air current is also driven at high speed through the electrodes, and this further elongates the flames, so that an arc of very considerable length is produced. This process is now in successful operation in Switzerland and the south of France.

Special attention is given to the interesting process of the Badische Anilin- und Sodafabrik. This particular process was illustrated experimentally at the International Congress of Chemistry held in London in May, 1909. An arc is caused to form throughout a long tube, and the air is blown in tangentially. In practice, arcs of 8 metres long are employed.

Which of these three processes will best stand the test of time remains to be seen. The *sine qua non* in all cases is, however, cheap power. In structional details each plant is being continually improved, and at present each of these processes is being commercially worked. The Paulin process is, we believe, very well adapted for the manufacture of concentrated nitric acid, which is so important in the manufacture of explosives, and if sufficiently cheap may readily be converted into a fertiliser. The other two processes are certainly well adapted for the manufacture of fertilisers, and there is no inherent reason why nitric acid should not also be produced in all cases.

F. M. P.

BIRD NOTES.

IN a lecture on the birds of Victoria delivered to the local Field Naturalists' Club in September, 1910, and published in vol. xxvii., No. 8, of the *Victorian Naturalist*, Mr. J. A. Leach directed attention to the extraordinary, and apparently unique, richness of Australia in birds. Not only, he remarks, has the country its own peculiar types of interesting birds such as emeus, malleebirds, black swan, laughing jackass, cockatoos, many parrots, lyre-birds, bower-birds, &c. (some of these being common to New Guinea), but it likewise contains representatives of every widely spread family of birds with the exception of vultures and woodpeckers.

To vol. vi., No. 2, of the Journal of the South African Ornithologists' Union Messrs. Bucknill and Grönvold contribute a paper on the eggs of certain South African birds, which, for the most part, have not been previously described or figured, the paper being illustrated by an exquisite coloured plate. The largest egg figured is that of the African hawk-eagle (*Eutolmaëtus spilogaster*), one of a pair taken in Matabeleland in 1904, and now in the Transvaal Museum. Perhaps the most interesting of all is the egg of *Poliohierax semitorquatus*, which, in its uniform whiteness, corresponds with those of the nearly related Indo-Malay falconets (Microhierax). In 1902, when the second volume of the "Catalogue of Birds' Eggs" was published, the British Museum possessed one clutch of eggs of Microhierax, but none of the allied African genus.

The third part of vol. x. of the *Emu* (December, 1910) contains a report of the tenth annual session of the Royal Australian Ornithologists' Union, held at Brisbane in October. Special attention was directed to the need for protecting Australian birds, and it was decided to request the Government of Tasmania to take action for protecting the penguins on the Macquarie Islands. Mention was made of the founding of a Gould League for the purpose of encouraging a love of birds among the rising generation. At one of the meetings the State Governor, Sir William Macgregor, expressed himself in favour of bird-protection, but had doubts as to the feasibility of its enforcement. His Excellency stated as an example of this difficulty that when in British New Guinea he passed laws for the protection of birds-of-paradise, and that these were nearly fatal to the red species. For during his absence a visitor asked permission to obtain one or two specimens for scientific purposes, and, having obtained it, straightway proceeded to shoot all that were obtainable, so that when the Governor, on his return, visited Ferguson Island he found not a single full-plumaged bird of this species remaining.

Country Life of January 1 contains two life-size illustrations of the newly named Irish coaltit, placed alongside those of its British representative, with descriptive notes by Mr. W. R. Ogilvie-Grant. The Irish bird is characterised by the light patches on the sides of the head and neck, as well as the occipital spot, being pale mustard-yellow, instead of white; the back olive-grey washed with yellowish cinnamon, in place of olive-grey; the upper tail-coverts cinnamon, in marked contrast with the rest of the upper parts, instead of brownish-fawn, not decidedly different from the back; the breast and belly whitish, washed with mustard-yellow, in place of whitish or greyish-white; and the sides and flanks cinnamon, instead of fawn. In freshly killed examples the mustard-yellow is bright and conspicuous, but fades a few days after death. The British coaltit, which Mr. Grant regards as a subspecies (*Parus ater britannicus*), occurs in County Down, a fact, in his opinion, affording additional evidence in favour of regarding the Irish bird (*P. hibernicus*) as a separate species.

Considerable discussion, reported in various issues of the *Field*, has taken place at the British Ornithologists' Club with regard to white-breasted British cormorants. While some ornithologists regard all such birds as immature, others maintain that certain examples are much older, and consider that one particular skin belonged to a bird of from twelve to fifteen months old. It was also suggested that white-breasted birds appeared sporadically in certain colonies, where they might become the dominating type.

Notes on the peregrine falcon in the Midlands and on the habits of the crested grebe are contributed to the January number of the *Zoologist* by Mr. O. V. Aplin. The former species, it appears, is still a regular visitor to the southern Midland counties, but the birds seen there in autumn are, in most instances at any rate, immature.

Of a very different character from all the foregoing is a paper by Mr. H. C. Tracy, issued in the Zoological Publications of the University of California, on the significance of white markings in passerine birds. The object of the inquiry on this subject undertaken by the author was to endeavour to reconcile the old theory that white markings in birds are recognition-signs, with the newer, and apparently contradictory, hypothesis that they are for protective purposes. The result, in Mr. Tracy's opinion, is that both theories are perfectly true and mutually supplement one another. Markings which are displayed only or chiefly when the birds are in flight, such as the white area at the base of the tail-feathers common to many terrestrial birds—as in our own wheatear—are recognition-marks, and it is noticeable that these are specially developed in gregarious groups. On the other hand, in the case of arboreal species, white markings at the base of the flight feathers, which become specially conspicuous when their owners are in flight, appear to serve for protection and for recognition. The author took, for instance, specimens of the green-backed goldfinch (*Astragalinus psaltria*) and black-headed grosbeak (*Zamelodia melanocephala*), in which these particular markings are well developed, and, after spreading the wings, "photographed them against sunlit foliage and backgrounds of leaves with spaces of sky showing through. The birds were difficult to find in the resulting prints. Undoubtedly the photographs, by their lack of relief, exaggerated the concealing effect; yet that there is such an effect, in general, it is safe to admit." Later on, it is added that when the bird takes wing, a different principle comes into play, and, as there is no broken background, the markings stand out conspicuously. "When we consider," continues the author, "the value to all birds ranging in the open foliage of instant recognition at a distance and sight-clues for the purpose of keep-