his life in Eastbourne, and occupied "Hodeslea," which is now the residence of the Union's treasurer. The house was built by Huxley in 1890 and he lived there until 1895 whilst his widow remained there until her death in 1914. Mr. Adkin has recently placed a bronze tablet on the house relating these facts.

Genetic Segregation,[1]

By W. BATESON, F.R.S.

LATER developments of genetics have been, in the main, attempts to discover the nature and scope of *segregation*. Mendel proved that certain characters are determined by unit-factors. Their integrity is maintained by segregation, the capacity, namely, to separate unimpaired after combination with their opposites. We have been trying, first, to ascertain specifically what characters behave in this way, whether there is any limit to the scope of segregation or any classes of characters otherwise transmitted. Among characters known to be subject to segregation are illustrations of most of the features by which plants and animals are distinguished. In regard to two classes of characters the evidence for segregation is, nevertheless, rather noticeably imperfect. No quite clear proof exists that differences in number—*meristic* characters in the strict sense—are governed by factors comparable with those that control, for example, colour. The extra toe of the fowl and the single leaflet of the monophyllous strawberry are perhaps the best examples, but reservations may be entertained. Also, though segregation can be demonstrated in regard to *quantitative* characters, parental types thus distinguished often fail to re-appear, and the inheritance is subject to special complications.

Groups or complexes of factors are now recognised as sometimes segregating whole. Were it not that on occasion elements of the complex become independent, the group would pass for one unit-factor. The sex-complex is an obvious example. Intermediate flower-colours, like those of modern sweet peas, probably arise by this process. The plausible suggestion that the new terms are only rare cross-overs in a closely linked series does not fit the evidence. A striking illustration appears in Œnothera, in which, as Renner lately showed, several groups of characters normally segregate as single factors. These complexes are in several forms not borne equally by the two sexes of the plant, and most of them cannot exist in the homozygous state. By these discoveries the Œnothera problem is greatly elucidated.

The second question is to determine when in the life-cycles segregation can occur. Admittedly it is a phenomenon of cell-division. If we knew the animals only we might confidently adopt the view of Morgan that normal segregation happens during the maturation process at the stage of synapsis, when the maternal and paternal chromosomes are believed to conjugate in pairs. Most of the facts of linkage may be thus well represented, but the absence of crossing-over in the sex-heterozygote (Drosophila and silk-worm) is not readily explicable, nor is there as yet extensive evidence that the number of linkage-systems agrees with that of the chromosomes—a primary postulate of Morgan's theory. The evidence for an orderly anastomosis, or even of any exchange of materials between chromosomes, is weak: and the visible features of chromosomes are scarcely suggestive of the prodigious heterogeneity requisite. Even if the linkage-systems correspond with the chromosomes, which is a most attractive conjecture, exchange of material between chromosomes need not be essential to crossing-over. It may be doubted, however, whether the general course of cytological evidence does not point to the *rôle* of the chromosomes being rather passive than active.

That in plants segregation even in its normal course is not limited to the reduction-division is now certain. In Matthiola, Campanula, Begonia, and Œnothera the genetic composition of the male and female organs may be normally different, and segregation cannot have happened later than the constitution of these organs. This kind of segregation must result in *Campanula carpatica* (experiments of C. Pellew) and in *Begonia Davisii* from the peculiar genetic properties of the female complex, for it re-appears in offspring derived from the female side for several generations at least, but not among those derived from the male side. Collins's evidence from Funaria proves further that sex-segregation may happen during the growth of a haploid form.

Periclinal chimæras and the production of distinct types from adventitious buds prove that segregation may take place during somatic development, whether in the differentiation of the layers or of the root. In the genetic properties of the tare-like rogues of peas there are features which not only illustrate the occurrence of gradational change in genetic properties, following somatic differentiation, but also show that this gradation affects the male and female organs differently. From these facts it must be concluded that normal and orderly segregation (apart from chance sporting) can occur at various cell-divisions, and not exclusively at reduction. Not impossibly these somatic segregations may be accompanied by some visible cytological differentiation, but that question must not be prejudged.

Having regard to the fundamental distinctions between the morphological relations of the germ-cells to the soma in animals and in the flowering plants, it is not surprising that the processes of segregation should be differently effected in these two groups of organisms.

[1] Abstract of the Croonian Lecture delivered before the Royal Society on June 17.

Colour Index of the British Isles.

AT a meeting of the Royal Anthropological Institute held on June 15, Prof. Arthur Keith, ex-president, in the chair, Prof. F. G. Parsons read a paper on "The Colour Index of the British Isles." He first reviewed the different ways of constructing an index of nigrescence, and directed attention to what he considered their weak points. Prof. Parsons proposed as a simple and workable index that the percentage in any group of individuals with dark brown and black hair should be added to the percentage with eyes in which any brown pigment is present, and the result divided by two. For practical purposes he found it better to record the percentages of dark hair and dark eyes separately. He then proceeded to examine the large mass of statistics collected by Dr. Beddoe in the middle of the last century, and pointed out that the first deduction was that women are in the mass darker than men, and that where the people are fairest the difference between the sexes is greatest, as the following table shows:

	No. of records	Index		Diff.
		Men	Women	
4 Northern Counties ...	1767	26·2	33·5	7·3
3 Eastern ,, ...	1563	34·4	38·2	3·8
2 Western ,, ...	4057	45·5	46·7	1·2

It therefore became necessary to exclude those

records of Beddoe in which the sexes had not been kept separate. Fortunately, however, nearly fifteen thousand records on males alone remained available. In the Northern and Eastern Counties, in the lowlands of Scotland, and again in Sussex and Hampshire, the correspondence of the tracks of the hair and eye indices was most marked, whilst in the Western and West-Central Counties, in Wales, and in the Highlands of Scotland the darkness of the hair was very much greater than that of the eyes. It was pointed out that those regions in which the hair and eyes correspond in lightness were historically regarded as the sites of the purest Nordic blood in these islands, while those parts in which the hair track was much higher than that of the eyes were the sites in which we have every reason to believe the Mediterranean blood had mixed most freely with the Nordic. Where the two races had mixed it appeared that the light Nordic eyes and the dark Mediterranean hair were the dominant factors. Except in Wales, a percentage of more than 50 dark eyes is unknown in the British Isles.

On comparing town and country dwellers it was noticed that the towns were darker than the country, except in those parts where the nigrescence was very high, when the reverse was the case. It was suggested that one reason for this might be that the town dwellers were more migratory than those of the country, though probably this did not account for all the difference

The distribution of red hair was worked out and found to be greatest in Scotland and the North of England, where the nigrescence was least. It was also pointed out that the evidence available showed that it was more prevalent among the upper than the lower classes, and that this probably coincided with a lower index of nigrescence in the upper than in the lower classes.

In opening the discussion, Prof. Keith said that Prof. Parsons's paper was of supreme importance to all who were interested in the origin of the peoples of this country. In his opinion, pigmentation was probably the key to the problem, and Prof. Parsons's new method of estimating nigrescence was a real contribution to the study of the subject. His index was, however, in a sense, an average, and must therefore be used with caution. In referring to the lack of correspondence between hair and eye colour, he instanced the dark hair found in conjunction with grey eyes in Wales, Ireland, and West Scotland—a conjunction also occurring in Scandinavia. After thirty years of observation, however, he himself was still in doubt as to the difference between a Celt and a Saxon, and felt it impossible to distinguish between individuals from, say, Suffolk and Connaught. In his view the basis of the population of these islands was predominantly Nordic.

Dr. Brownlea said that he considered the results based upon the distinction of sex were not quite trustworthy. He held that six distinct races went to make up the population of these islands, one of these being a distinct red-haired race.

Mr. H. Peake, while agreeing with Prof. Keith that averages were untrustworthy, said that Prof. Parsons's index was not quite an average, and in any case it was the best method of dealing with observations which had been advanced so far. The conjunction of dark hair and light eyes was a puzzle. Was it due to a tendency in the Mediterranean race towards light eyes, or was it due to a fusion between the Nordic and Mediterranean types? Certain characters seemed to follow sex, and in cases where there had been an immigrant male population intermarrying with the females of the country, the dominant character of the male reappeared in the male line. Prof. Parsons's results pointed to this, in that where there was a considerable Nordic influence there were wide sex differences; where Nordic influence was small there was little difference between the sexes. He pointed out that not all red-haired people were alike in shape and colour. It had been suggested that red was a variant of fair hair, *e.g.* in Scandinavia. The older theory was that it was a border-line colour between fair and black. In Ireland, Wales, and Scotland it might arise from a crossing of Nordic and Mediterranean types. On the other hand, in the North of England it might be a variant of fair hair, as in Scandinavia. But even Scandinavia, he pointed out, was not homogeneous; light and dark types occurred, and therefore in that country also red hair might be due to contact.

Dr. Shrubsall said that in his investigations of the incidence of dark hair in town populations he had found that the longer the town history of a family, the darker the hair. He pointed out that the occurrence of red hair in the March country of Ireland, Wales, and Scotland supported the view that it was due to contact of light and dark types.

Dr. Stannus said that while investigating albinism in Africa he had found a large number of red-haired individuals, but in these cases the pigment was always found in solution. The problem was biochemical, and, in his opinion, microscopical examination was essential to show whether individual cases were cases of black hair in which the pigment had not been thrown out in granular form.

The chairman, in bringing the meeting to a close after Prof. Parsons had briefly replied, said that the discussion had shown the desirability of a much wider survey of the people than had hitherto been made. The results would have an important bearing upon such questions as the relation between health and race. He hoped that the Government might be induced to help in this great undertaking.

Army Hygiene and its Lessons.[1]

By LT. GEN. SIR THOMAS GOODWIN, K.C.B.

UNTIL quite recent years it has never been sufficiently recognised that a very large proportion of Army medical effort should be directed towards the prevention of disease. The fact that in all wars in the past more men died from disease than from enemy action appears to have been accepted more or less with resignation, and regarded as inevitable. During the later years of the nineteenth century the increasing advances in science and our more exact knowledge regarding the ætiology and transmission of infective diseases led many medical officers to attempt to create barriers against the spread of disease by known paths, but there was a lamentable lack of co-ordinated effort.

Towards the close of the eighteenth century we begin to glean something in the nature of figures regarding sickness in armies in the field. In 1792 the allied Austrian and Russian armies were in Champagne; they commenced their retreat on September 30, and by the end of October had evacuated France, and during that short month, without any considerable fighting, they lost 25,000 men, or more than one-fourth of their number, every village being filled with dead and dying.

Accurate figures are unobtainable regarding Napoleon's campaign in 1812, but we learn that in June, 1812, he crossed the Niemen with a magnificent army

1 From three Chadwick Lectures delivered on March 8, 15, and 2 entitled "Army Hygiene prior to the Recent War," "Army Hygiene during the Great War," and "Army Hygiene in the Future."