

(500 — 300 mb.) also but the paucity of thermal wind data for this level discouraged them from undertaking the study at this stage. They would, however, like to mention that in the cases of nor'wester activity on 5-6-52 and 6-6-52 for which adequate amount of thermal wind and thickness data were available, there were very well-marked cold troughs at the 300 mb. level also, 18-24 hours before nor'westers developed. The thermal winds (500 — 300 mb.) in these cases were SSE/SW over the entire region where the nor'westers developed while the actual winds in the same region were SW/W.

From the above, the authors are tempted to conclude that the advection of colder air between 10,000' and 20,000' and possibly also between 20,000' and 30,000' appears to be the final determining factor in the outbreak of nor'westers, at least when they are widespread.

In conclusion, it may be pointed out that the technique adopted by the authors in this investigation is a simple one, not open to any theoretical objection from the point of view of validity of the geostrophic assumption, as the phenomena of nor'westers occur in regions to the north of latitude 20° N. and during a period of the year when the westerlies are predominant over north-east India and Eastern Pakistan in the upper air. Further, there is usually a fairly adequate amount of Pilot Balloon wind data at the 500 mb. level over India except on

very cloudy days and the accuracy of these data is quite well known. Consequently, it is possible to identify the existence of cold pools or cold troughs qualitatively even from the thermal wind circulation patterns on days on which Radiosonde data are not available or are not reliable on account of instrumental errors.

Full details of the seven cases referred to above, together with diagrams showing the thermal winds and thickness patterns at the 500 mb. level and the thunderstorms superposed upon these patterns for purposes of comparison are being sent for publication in the *Indian Journal of Meteorology and Geophysics*.

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MENDELIAN ANOMALIES

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THOUGH over fifty years have elapsed since Mendel's Law of Segregation was re-discovered by three different investigators, De Vries, Correns and von Tschermak in 1900, no attempt apparently seems to have been made to collect systematically Mendelian anomalies, occasionally observed in experimental data and scattered in the genetic literature. Not without exception every population has a classical Mendelian ratio of 3 : 1, etc. Thus in the course of intensive genetic research during the past fifty years, it has not been a rare observation that abnormal segregations in families, arising from various crosses, have been recorded by different authors, who have also expressed doubts in regard to offering an explanation on ordinary Mendelian lines. For example, Luther Smith⁸ in his review on genetics and cytology of barley has rightly remarked, "Workers who have studied many genetic characters have noted that not all F₂ segregations are

exactly 3 : 1, although only one gene pair is involved. There are a number of possible reasons for this discrepancy between theoretical and observed ratios. However, not many workers have taken the time and trouble to determine which of the possibilities actually obtain".

Yule¹⁴ reporting on the data afforded by the experiment initiated by Derbyshire, remarked, "No explanation is offered of the remarkable divergences from the expectation based on simple Mendelian theory; they remain a puzzle. But it seems clear that the theory is inadequate completely to explain all the facts. The mechanism at work appears to be more complex than is commonly postulated". Also Bateson's¹ remarks in this connection that "even as regards the outline of genetical principles, finality has not been attained," may not be out of place to record.

Again, Pease¹⁰ working on the inheritance of

weights in rabbits, recorded, "A plausible explanation of this on ordinary Mendelian lines does not seem possible".

There also exists enough evidence to show that a particular character is determined by one pair of factors in a particular set of experiments while in another set the same character was determined by two pairs of factors or even more. Such cases are not infrequently recorded in the genetic literature on rice,⁷ where out of 189 pairs of characters analysed, 40 show such inconsistent inheritance. Cases have also been recorded by some workers where results agreed not with the expected ratio but with other values.²

It is also not very rare to find that out of a large number of F_2 families in a particular cross, grown from individual F_1 plants, one or more, showing significant deviations.

In the course of our work, we have made a critical survey of genetic literature from this point of view and classified the data on Mendelian anomalies into five different types as given below, to prepare a code of these deviations.

CLASSIFICATION OF MENDELIAN ANOMALIES

(a) Ordinary Deviations

Generally, in an experiment on Mendelian segregation involving one pair of genes, the different populations belonging to the dominant character bear to the populations belonging to the corresponding recessive character, ratios both greater and less than three for different families of a generation. Similar conditions hold good in cases dealing with more pairs of genes. In such a case the statistically significant deviation is said to be of the ordinary type.

(b) Unidirectional Deviations

When for different families of a generation, the ratios of segregation are all either greater than or less than the expected values, the deviation is said to be unidirectional.

(c) Evolutionary Deviations, i.e., Deviations Observed in the Generations, F_n, F_{n+1}, \dots

When the ratio of segregation tends to either decrease or increase as we go upward in the generations F_n, F_{n+1}, \dots the deviations are said to be evolutionary. It is suggested that due to the action of an evolutionary factor, the trend of deviations in the series F_n, F_{n+1}, \dots is directed towards a definite genetic equilibrium.

(d) Aberrant Segregations

Those segregations which cannot strictly be assigned to the Mendelian type, are said to be aberrant and they ought to be called Mendelian puzzles.

(e) Inconsistent Inheritance

It is not very rare to observe a particular pair of characters being controlled by, say, one pair of genes in some cases and the same pair of characters controlled by two or even more independent pairs in other cases. Such cases of inheritance are examples of inconsistent inheritance.

It is envisaged that the above code might help those interested in the subject to offer explanations or formulate corollaries to Mendel's Law of Segregation, such as the Hardy-Weinberg Law, connected with population genetics. (Sinnott, Dunn and Dobzhansky¹²).

In this connection, Bateson¹ once remarked that "though we can no longer doubt that segregation is, perhaps by more than one process, commonly effected at the reduction division, evidence steadily accumulates showing that at least in plants of many kinds comparable segregations occur in somatic divisions also". Naturally, this constitutes one of the factors responsible for the complexity of the phenomena of segregations. Unless the inter-relations and inter-actions of somatic divisions on one hand and reduction divisions on the other, are thoroughly understood, the complexity will continue to be a puzzle. The recent cytological investigations carried out by Huskins and his co-workers,^{4,5} Wilson and Cheng,¹³ Huskins and Cheng⁶ and Menzel and Brown⁹ on chromosome multiplication and reduction in somatic tissues and somatic segregation, require further extension and application since these authors have not thrown any light on the bearing of these biological processes on Mendelian heredity. For this very reason Franzke and Ross³ remarked, "If this phenomenon is more than an apparent separation, it is surprising that some mention of effects on heredity resulting from such chromosomal separations has not been made". These authors found, "Colchicine treatment of full sibs of a true breeding variety of sorghum gave variants possessing a number of ancestral characteristics of which some bred true immediately. Untreated stock of a full sib of the above has not segregated in subsequent generations. In no case among these has the chromosome number been found changed". Considering the question of segregation observed in F_2 progenies from treated F_1 and untreated F_1 plants, it is very significant to observe that the results of segregation in F_2 progenies in the case of height of plants, were different in these two cases. "The distribution from progeny of treated F_1

plants shows a definite concentration around one point causing a distinct difference in form of this distribution from that of the untreated which approaches that of a normal curve. This and the lower mode of the progeny from treated F_1 plants demonstrates a significant difference in degree of uniformity found within progenies from treated plants as against progenies from untreated plants". Thus colchicine treatment causes homozygosity in respect of height of plants thereby modifying the normal segregation. So far as we know, none has carried such investigations, a step ahead to examine the nature of the resulting anomalous segregations in generations like F_2 , F_3 , etc. A contribution to Mendelian anomalies coming from this direction, is yet to be settled.

Richharia¹¹ had also made similar observations on colchicine-induced variants in respect of oil percentages in *Sesamum orientale*. He found that colchicine treatment of plants of a true breeding variety of sesame gave variation

in respect of oil percentages between 51.21 and 54.13, whereas the normal progenies varied between 51.19 and 53.80 per cent.

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STREPTOMYCIN AND ISONIAZID

THE Second Report* to the British Medical Research Council by the Tuberculosis Chemotherapy Trials Committee gives the results of three months' treatment of 364 patients suffering from pulmonary tuberculosis of different degrees of severity. Of these, 142 were treated with streptomycin 1 g. daily and isoniazid 100 mg. twice a day, 102 with streptomycin 1 g. daily and sodium para-aminosalicylate (P.A.S.) 20 g. daily, and 120 with isoniazid 100 mg. twice a day alone. Over this period streptomycin and isoniazid, given together, were superior to streptomycin and P.A.S. in their effect on weight gain and blood sedimentation rate, and rather more effective in improving general condition. There was no significant difference in the effect on pyrexia, sputum-conversion or the radiographic appearances. Comparison of streptomycin and isoniazid with isoniazid alone, over the same period, showed that the combined treatment was much more effective in lowering the sedimentation rate and improving the radiograph. It was slightly more effective in returning the temperature to normal. The effect on general condition and on weight was similar with both treatments.

When streptomycin and isoniazid are given together, the reciprocal suppression of drug resistance is of the same order as that of streptomycin and P.A.S. over a three-month period. But the few available figures for isoniazid resistance at four months are less reassuring. Three out of eight positive cultures were resistant, though in most of these patients streptomycin was given only three times a week in the fourth month. Until more evidence is available, these results suggest caution in giving streptomycin less often than once daily when it is used with isoniazid, and we do not know that the combination will maintain its clinical superiority when continued for more than three months.

The chemotherapy of tuberculosis is no longer simple. Its very success and diversity are creating ever-changing problems with which everyone who treats the disease must become familiar. The pace of research is such that even the conclusions of the present authoritative report may be out of date in a few months.

* *B. M. J.*, March 7, 1953, p. 521.