the *fine-grained sediments*, the tests led us to conclude that the variations were *not* usually attributable to random sampling alone ($P < 0{\cdot}05$ for the majority of species, varieties, and replicate series). Some results for the heavy mineral suites from two of the three main sedimentary grades examined are summarized in the accompanying table. Varietal analyses have been omitted for reasons of space.

Systematic errors (investigated by analysis of variance) were found to be serious only for certain flaky minerals in the fine-grained sediments. No practical justification was obtained for the theoretical criticisms frequently levelled at the transect (and 'random field') method of counting. It is clear that, providing the specific and varietal size-differences are not excessive (a condition hydrodynamically assured for the allogenic suites of most sediments), their adverse influences upon frequency estimations obtained by the transect method are not sufficiently great to warrant consideration.

The main conclusions arising from our work may be summarized as follows: For most allogenic minerals but certain flaky species (micas, chlorites, etc.) within coarse- and medium-grained sediments, the errors of number-frequency due to normal laboratory treatment are sufficiently small to be neglected, providing that the container of the separating apparatus is large enough for adequate dispersal of the grains. For fine-grained sediments, the laboratory errors are liable to be considerable for all allogenic species. A method for estimating and manipulating the latter has been given before[2].

We are thus able to offer independent confirmation of certain of the results obtained by Rittenhouse and Bertholf.

Transect errors are mainly of theoretical interest, and will be dealt with elsewhere.

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Transmission by Insects of a Plant Virus Complex

STUDIES on the rosette disease of tobacco, first recorded by Wickens[1], have shown that the disease is a complex one consisting of two undescribed viruses for which the names 'vein-distorting' and 'mottle' viruses respectively have been suggested[2]. The vein-distorting virus cannot be transmitted mechanically but is dependent upon an aphis vector; whereas the mottle virus is easily transmitted by sap-inoculation. Investigation of the insect-relationships of these two viruses[3] has revealed some interesting facts. All attempts to transmit the mottle virus by aphis vectors have failed, *unless it is accompanied in the plant by the vein-distorting virus*.

The following description of one experiment out of many will make this clear. A tobacco plant, var. White Burley, infected with the mottle virus, was colonized with the aphis *Myzus persicæ* Sulz.; after the requisite feeding period the aphides were removed and colonized on twelve young tobacco seedlings, 5–10 aphides per plant. All twelve plants remained healthy. The mottled tobacco plant, from which these negative attempts at transmission were made, was then infected by means of aphides with the second component, the vein-distorting virus. In due course the plant developed the rosette virus complex. This plant was then again colonized with virus-free aphides and, after the requisite feeding period, these aphides were transferred to twelve tobacco seedlings, but using only one aphis per seedling as compared with 5–10 in the previous experiment. Nine out of the twelve seedlings developed the rosette disease, which of course contains the mottle virus as one of its components. Having once picked up the mottle virus together with the vein-distorting virus, the aphis retains them both for long periods and in successive transfers at twenty-four hour intervals can infect twenty consecutive plants without recourse to a fresh source of virus. Having once become infected with the virus complex the aphis, in a series of transfers, sometimes transmits the mottle virus alone, sometimes the vein-distorting virus alone and sometimes the whole complex. A somewhat similar phenomenon has been recorded in the aphis transmission of two potato viruses[4], but a clear-cut obligate relationship such as this between two viruses so unlike as the components of the rosette complex seems to be of unusual interest.

The most likely explanation of the phenomenon is a quantitative one; namely, that there is more mottle virus in a plant infected with the complex disease than in a plant containing this virus alone. But dilution tests made from the complex and from the mottle virus respectively do not appear to support this explanation.

It is possible that this phenomenon has a wider application in Nature than has been realized, and it may be discovered that other plant viruses which are apparently not insect-borne when alone can be so transmitted when in the presence of another virus.

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Selective Power in Virus Transmission Exhibited by an Aphis

THE selective power exhibited by insects in their transmission of different plant viruses is a subject of considerable interest since it is calculated to throw some light on the relationship between virus and insect. Such selective transmission has been studied by Hoggan[1], Kenneth Smith[2] and Kassanis[3], while Black[4] has shown that there are two strains of potato yellow dwarf virus, each with its specific insect vector.

So far as I am aware, however, the selection of one virus by a particular aphis species, out of a complex of two closely similar aphis- and sap-transmissible viruses, is a new phenomenon. This has been demonstrated in my experiments on the aphis-transmission of viruses affecting cruciferous plants.