

THE TERM 'COLLUVIAL' AS APPLIED TO CLAY DEPOSITS.

WHILE investigating clay deposits in the northern part of Georgia, my attention was called to a large number of recent deposits of some economic value, which were neither residual nor alluvial in origin, and in attempting to classify them the need for a special term was apparent. The term 'colluvial' is proposed to designate a type of clay deposits which occur in sinks or depressions and at the foot of slopes. The term 'colluvial' is used by G. P. Merrill¹ to include talus and cliff débris, and the soil resulting therefrom. By extending somewhat the meaning of the term as used by Dr. Merrill, the particular type of clay deposits in question can be included under it. The term, in connection with clay deposits, has been very little used, but deserves recognition, both from a scientific and economic view point.

Colluvial clay deposits differ from residual deposits in that they have been transported, and from alluvial deposits in that they have not been carried in suspension by streams and are not flood-plain deposits. They occupy a position midway between residual and alluvial deposits, and may, by gradual transition, pass into either. They are due to the transportation of residual material, by gravity and wash, to the foot of slopes.

The factors in the formation of colluvial clay deposits are: surface decay of rock masses, producing residual deposits, transportation of this residual material by gravity and wash, and rearrangement by mechanical and chemical changes. To illustrate the formation of a deposit take as an example a hill of residual material derived from a crystalline rock. The section of this residue is, beginning at the top, red clay soil containing coarse quartz fragments, yellow to gray clayey residue, disintegrated rock, and, finally, unaltered rock. By wash by rain water, the finer clay and mineral particles of the residue are carried furthest and lodged at the slope of the hill, forming the clay deposit. In granite regions, the clay at the foot of a slope may be almost

white, gradually changing into the red and yellow soil higher up the slope.

An analysis of one of these colluvial clays, from a granite region, is:

Moisture at 100° C.....	2.462
Loss on Ignition.....	8.654
SiO ₂ (total)	60.110
SiO ₂ (sand)	31.150
Al ₂ O ₃	24.256
Fe ₂ O ₃	2.080
CaO110
MgO	trace
MnO	trace
Na ₂ O262
K ₂ O	1.647
TiO ₂754
Total	100.331

OTTO VEATCH.

GEOLOGICAL SURVEY OF GEORGIA.

QUOTATIONS.

'BOTANY IN ENGLAND': A REPLY.¹

IN the September number of the *Journal of Botany* Mr. James Britten deals at considerable length with the portion of my presidential address to the botanical section at the recent meeting of the British Association at York, which was printed under the title 'Botany in England.'

As Mr. Britten's criticism seemed based on a misapprehension of the drift of my remarks, and as it was printed in a medium often consulted by systematic botanists, I naturally sent a reply which I hoped might be inserted in a forthcoming number of the same journal. In his capacity as editor, however, Mr. Britten did not see his way to insert my reply in the form in which I had written it. As I was unable, in my turn, to fall in with the restrictions imposed by Mr. Britten, hospitality for a rejoinder had to be sought elsewhere. It is under these circumstances that the present note appears in the pages of the *New Phytologist*.

Whilst welcoming any criticisms that Mr. Britten may think fit to make, I may, perhaps, be permitted to express the hope that the tone which animates his recent utterance may find

¹ 'Rocks, Rock Weathering and Soils,' p. 319.

¹ From *New Phytologist*, Oct., 1906, pp. 173-176.

no permanent place in botanical controversy. When one's shortcomings are so rudely exposed there is the temptation to emulate one's critic and take reprisals.

In my York address I endeavored to show that in the general advance of botany in this country during the last twenty-five years our great centers of systematic botany had become incased, as it were, in a sort of water-tight compartment, and this from causes inherent in their organization. I do not think it can be seriously questioned that the herbaria pursue their work apart. One has only to turn to the utterances of men so well qualified to speak for systematic botany as Sir George King and Sir William Thistleton-Dyer. The former speaks of its neglect and decadence; in his presidential address to Section K, British Association, Dover, 1899, p. 16, the latter refers to its decline as a 'serious peril.' It is not even an open secret, it is common knowledge. Mr. Britten, when his remarks are stripped of the irrelevancies and innuendoes which adorn them, tells us in effect that my apprehensions are groundless and that systematic botany jogs on happily without the schools. Now this is dangerous optimism, or it would be if taken seriously.

The position seems to be this: rightly or wrongly and in spite of warnings we are permitting the herbaria to become stranded: the universities, schools and other institutions which diffuse and stimulate an interest in botany are not laid under contribution as they might be. Systematic botany hardly gets its fair proportion of the best that is available. To my mind this is a great misfortune, a source of weakness; nor do I believe I am indiscreet in ventilating the subject. My critic would say, perhaps, 'Teach systematic botany by all means and then send your people on to us.' But that is not the way to get recruits worth having. A mere pious opinion in favor of a given branch of knowledge will effect nothing, even if you put your precepts into practise. If one takes stock of the various places which are centers of activity in turning out students equipped and keen to pursue science, one finds, with hardly an exception, that those who guide these institu-

tions place original investigations in the forefront. Heads of departments are selected largely on the strength of their qualifications for research, and so far as circumstances permit support is afforded for its prosecution. Hence, if the great school of systematic botany is to be revived in this country, the systematists themselves, *i. e.*, those with the equipment of the great herbaria behind them, must take the leading share in the campaign. This was my principal contention at York, and I do not think matters will be remedied until the herbaria become attached or related in some way to the educational system. Unless our work is to be sterile we must take our share in training those who are to come after us. Robert Brown and Sir Joseph Hooker are exceptions to every rule: if only we could control genius in respect of time and place of its appearance, all would be well; but experience shows that we have to depend on the normal, and that these two men were not normal is shown by the fact that none like them have been produced for the past half century.

I should like to see members of herbarium staffs *ipso facto* members of the neighboring university, or, at any rate, a selection from among them. It may be urged that if the systematist is to discharge professorial functions it must be at the sacrifice of some of the duties which he at present performs. This is very true. But it was one of my points that much of the routine work which falls to his lot is within the capacity of subordinates. You want two classes in a herbarium: the scientific workers who really advance the subject, and subordinates who would carry on a great deal of the routine work. The former would be free not merely to write monographs, etc., along the accustomed lines, but also to open up new lines of attack on old problems. If ever there was a time when the future of systematic botany was full of promise, it should be the present. The perfecting of cytological and anatomical technique and the improvement in breeding methods place new implements at its disposal for broadening and deepening its work. Botanists should pull together with a view to so modifying the

system that we in this country may take our proper place in the general advance. If we look abroad to centers of activity in systematic work, I think we shall find the relation between the university, the herbarium and the garden, to be an important factor in the case.

When Mr. Britten says I would have botany the sole possession of the schools, he falls into error. He depicts me as one who would lock the door and have a bonfire. His readers may rest assured that the unique and precious collections of our herbaria will suffer no hurt should 'men of my stamp' ever get a finger in the pie; nor would the interests of the various classes who consult them be prejudiced. Possibly Mr. Britten has allowed himself to be misled by a too literal interpretation of figures somewhat incautiously employed. My meaning was this: We must not be afraid to go ahead and if necessary modify the line of attack on systematic problems, even if by so doing our present collections should cease to hold the same relative scientific value that they now are supposed to possess. They will always retain their interest; whilst their historic value will ensure their being cherished.

To read his words one might suppose violent annexation of the herbaria and their custodians had been advocated. But if Mr. Britten will turn to my address he will find nothing more revolutionary than a proposal for a working arrangement.

These things, alas, are not burning questions—like district railway fares and the Times Book Club. Some day let us hope a minister will arise; one who sees and cares. The readjustment will be effected without a revolution and the only wonder will be that we remained so long on the old lines.

Regarding the question of fusion of the herbaria of Kew and the Natural History Museum, surely this ancient proposal (which Mr. Britten tells us dates from 1848) may be discussed without emotion. In any case it is of relatively secondary importance and the case for it rests largely on the need of utilizing effectively our resources. My motive in raising it in my address was the knowledge that unless you pack something concrete into

the loading of your gun, the smoke clears off and there is no effect.

On its merits and for reasons already advanced I am disposed to view the proposed fusion with favor, though age and wisdom, according to my critic, are ranged on the other side. As a site, Kew seems preferable for the united herbaria in view of the contiguity of the gardens, which offer such unlimited facilities for the attack of systematic problems from the cultural side. The disadvantage of distance is less serious than Mr. Britten supposes, for the students who, it is contemplated, would avail themselves of the improved facilities would be mainly of the post-graduate type, devoting the whole of their time to systematic botany. The question of 'openings for trained students,' by which Mr. Britten means remunerated posts was never raised by me in this connection. It is remarkable what a number of persons, thoroughly trained, remain in the universities carrying out original investigations for love of the thing, often making considerable sacrifices so to do. This is a hopeful sign for the future of science, and it affects botany in common with the other sciences. Perhaps Mr. Britten will consider whether it is worth while for the herbaria to lay this source under contribution. All the same, I fully appreciate Mr. Britten's point when he thanks heaven that the museum is managed by trustees. In so far as the trustees may be regarded as a sort of half-way house between a government office and a university, that is something to be thankful for. Once you make connection between the systematic institutions and the university, the new growth will begin. In time the university will be worthy to enter more fully into the possession of its heritage. Of course an immense part of the work of Kew must remain outside direct university influence. All the same my dream of the future is a modified Kew discharging its economic and imperial functions, and at the same time supporting a great university department. It may not be realized in our time; its development at best must be slow; what we want is a beginning, towards which, indeed, the way is mostly paved. F. W. OLIVER.