

apparat; auch in den Ganglienzellen scheint für ihn statt des Neurofibrillengitters nur ein Chromidialapparat zu existieren. Ebenso sah seinerzeit Rohde auch bei Hirudineen und *Lumbricus* dort, wo ich Neurofibrillen beschrieben habe, nur ein überall gleiches Spongioplasma. Held behauptete früher, meine Angaben über Neurofibrillen beruhen auf einer groben Verwechslung mit Gliagewebe. Heute denkt er anders. Und ich glaube, für die große Mehrzahl der Biologen gilt die Existenz der Neurofibrillen und ihr wichtiger Anteil am Aufbau und an der Funktion des Nervensystems als endgültig festgestellt. Daran wird dadurch nichts geändert, daß wir die Neurofibrillen bei gewissen Tieren noch nicht mit der notwendigen Sicherheit nachweisen können, und daß sie Goldschmidt bei *Ascaris* nicht zu differenzieren vermag.

Mit diesen Zeilen möchte ich wieder einmal hauptsächlich dagegen protestieren, daß man mir Angaben und Anschauungen imputiert, die mir ganz fremd sind; daß man meine Resultate verschweigt, wenn man sie nur bestätigen kann, dagegen alles stark hervorkehrt, was man anders gesehen zu haben oder anders deuten zu müssen glaubt. Wohl niemand hat dies alles in so ausgiebiger Weise getan, wie neuerdings Ramón y Cajal. Dem will ich jedoch nächstens in einer größeren Arbeit entgentreten.

Napoli, am 20. September 1907.

10. On an Improved System of Recording for use in Faunistic Work.

By S. P a c e, late Director of the Millport Marine Station, Scotland.

eingeg. 26. September 1907.

In connection with the systematic investigation of the fauna and flora of the Firth of Clyde, which I have recently been organizing at Millport, but which has now unfortunately been abandoned¹, a system of recording the results of collecting operations has been elaborated which may perhaps be of interest to those engaged in similar work elsewhere. By its means a considerable amount of the purely mechanical labour which is involved in the mere entering up of collecting records is obviated; and at the same time it is rendered possible to record, in a

¹ At the last Annual Meeting of the Marine Biological Association of the West of Scotland, long outstanding differences regarding the policy of the Association respecting the conduct of its Marine Station at Millport, culminated in the passing of a resolution prohibiting the prosecution of organized research at the Marine Station. The scientific section of the Association thereupon resigned in a body, and the Station is now to be devoted to "popular" objects and to elementary education. This, from the biological point of view is to be much regretted; for the Millport Marine Station has enjoyed such quite exceptional financial and other advantages that it was in a position to carry on faunistic investigations on a scale which has not yet, so far as I am aware, been attempted at any marine station.

form available for ready reference, the fullest information respecting a local fauna or flora.

The recording of the full contents of an ordinarily rich dredge-haul, for instance, is a matter requiring the expenditure of some considerable time if it is undertaken in the ordinary way by writing out a list of the names of all the species met with in the haul; and for the purpose of a detailed "Biological Survey" such a crude method is quite out of the question unless a very large clerical staff can be maintained. If faunistic investigations are to be carried out with scientific precision, it is essential to record not only the names of all the forms which may be present in a particular batch of material, but also of those which are definitely absent from the sample; and it is necessary, moreover, to take notice of many other observations regarding the different forms beyond the mere fact of their presence or absence: by the system now to be described all this is rendered quite possible with even a very limited staff.

In the first place, a complete list is prepared of all the forms, arranged in classificatory order, which are likely to be met with in the district; and this list is then made to serve for an indefinite number of dredgings, tow-nettings, etc. This result is effected by intercalating between the pages on which the lists of names are written out, other sheets specially prepared to receive the actual records; the papers being all held firmly together and in place by binding them in 'loose-leaf' files², which, while keeping the papers safely in position, at the same time permit of the ready removal and replacement of any individual sheet. The special "Record Sheets" are of foolscap size, and are ruled on both sides of the paper into a series of vertical and horizontal columns. Now, the sheets of paper bearing the lists of names are cut to a greater width than that of the ruled record sheets, so that the former project about 8 cm beyond the latter when they are bound together in the file; and, as the lists of names are written on these projecting margins and on both sides of the paper, the writing is plainly visible to each side of the record sheets when the file is opened out for use. The names, which are thus repeated on both sides of the opening, are so spaced, that they and the horizontal columns of the record sheets are immediately opposite to one another. The vertical columns of the record sheets are each appropriated to the analysis of one single haul of the dredge, or of such other individual sample of material; and in the case

² Of the various loose-leaf files at present known to me, the "Stolzenberg" would appear to be the most convenient for the purpose of the Record Books, in that it holds the papers sufficiently firmly in position that there is but little tendency for the ruling of the sheets to get 'out of register'. On the other hand: these files require to be handled with considerable care as their contents are very liable to become torn by the binding mechanism if they are at all roughly used.

of systematic survey observations, a column is retained throughout the whole series of record sheets for each sample collected, even though comparatively few of the forms on the list may actually be present in the material. The particulars regarding each species or form, its presence or absence, relative abundance, and a number of other data are recorded, together with a reference to any more extended notes which may have been made, by means of suitable symbols in that space of the record sheets which is directly opposite to the name of the species in the list, and at the same time forms part of the particular vertical column which has been reserved for the sample of material under analysis. The entries are authenticated by the observer's initials being placed in a special space provided at the foot of the column; while two other spaces at the head of each column are reserved respectively for the "Chart Reference", denoting the particular ground from which the material had been obtained, and for the "Reference Number" of the sample; from this latter entry all necessary information regarding the collecting of the batch of material in question may be readily obtained. The particulars relating to the various dredgings and other samples of material, and the conditions under which these have been collected, are entered in the field upon loose forms specially printed so as to provide spaces for the entry of the fullest data. The "Reference Number" employed consists of the date with the addition of a distinctive letter for each of the various samples taken on that day. Thus: 1907. 6. 15, C. is the reference number of the third sample collected on the 15th of June 1907. The "Collecting Forms" are also preserved in loose-leaf files for permanent reference.

To facilitate entry and at the same time to minimise any risk of error, the lines on the record sheets are ruled in red and blue ink alternately; and as has been already mentioned, the list of names is repeated on each side of the opening: in these ways the difficulty which is so often experienced, with say a railway time-table, of carrying the eye across the sheet is practically eliminated. As a further precaution, it is well before commencing to record a fresh sample to fill in any blank spaces which may have been left in the previous column with the — sign.

Two sets of files are employed in actual practice, the lists of names in each set being exact duplicates of those in the other. One of these sets of files is intended for use in the field, and is fitted with a sufficient supply of blank record sheets distributed between the lists of names. So soon as one of the loose leaves of the "Field Record-Book" becomes fully entered, it is transferred to an equivalent position in the corresponding file of the second or permanent series; and this "Permanent" record book is for safety never permitted to leave the office. As will be readily understood, it is absolutely essential that each individual

record sheet shall be clearly marked by a distinctive sign to indicate which of the numerous sections of the list of names it is intended to accompany, as otherwise hopeless confusion will almost certainly result. Particular care must also be taken in ruling and in perforating the paper to ensure the proper 'register' of the different sheets when these are bound together in a file. In order to minimise the risk of obliteration of the records through accidental wetting while the sheets are in use in the field, all entries are made with a good quality black-lead pencil, while the list of names is written in waterproof indian ink: ordinary writing ink should on no account be employed for record work. It is also important that the paper utilised for the record sheets shall be of good quality and of fairly stout texture.

Any more extended notes, such as cannot be expressed by means of symbols, which it may be desired to make regarding any particular form, are entered separately: a series of classified "Species Books" being provided for the purpose. These "Species Books" are also prepared on the loose-leaf system, and one or more sheets are reserved for each individual species or form. Also, at such intervals as may prove convenient, the tabulated entries in the Record Books, together with any accompanying notes there may be, are carefully gone through and analysed; a short descriptive note regarding each species is then drawn up for inclusion in the "Species Book", so that the latter comes to contain a full account of all that is known respecting each individual local form. Similarly, from time to time, notes regarding the fauna and flora as a whole, and also the physical features of the various collecting grounds, are compiled for entry in the "Grounds Book" from the data contained in the printed collecting forms.

It may perhaps be of interest to give a list of those symbols which have proved most useful in actual work. In the first place, one or other of the following three symbols is made the first entry of every record: —

+ = that the form in question was present in the sample under analysis.

0 = that it was obviously absent from the sample, or that it was specially looked for and not found.

— = that the particular form was not noted, but that as it was not especially sought after its presence may have been overlooked.

It will be noted that the — sign can readily be converted into the + if later on such alteration becomes necessary by the discovery of actual specimens among any of the material remaining unworked.

The relative abundance of the different forms present in the sample is next indicated by a numeral expressing the actual number of individuals observed, or by one of the following signs: —

∞ = that the particular form was exceedingly abundant: that there were more specimens present than could be gathered or counted.

A = That it was abundant in the sample.

C = That it was common.

S = That several specimens were obtained.

F = That a few specimens only were obtained.

The comparative size and maturity of the examples is indicated as follows: —

l = That the specimens obtained were large.

s = That they were small.

m = That they were minute.

a = That they were adult.

i = That they were immature.

j = That they were juvenile.

e = That they were undergoing ecdysis.

The following are the more important general symbols employed for the recording of particulars regarding breeding, etc.; but in some sections it has also been found convenient to employ additional special symbols: —

B = That the form in question was breeding at the time when the record was made.

E = Records relating to the eggs, spawn, egg-capsules, gonophores, etc. of the particular form.

R = That the gonads were ripe.

h = That the eggs, or their equivalent, were hatching out.

L = Records relating to the free larvae of the form. In certain groups additional special symbols are also used to differentiate distinguishable larval stages.

Many of the signs employed in this record system admit of further qualification by the addition of one or other of the following symbols: —

n = Nearly, almost.

p = Past, over or completed.

v = Very.

Certainty, or the reverse, regarding the identification of the form recorded can be expressed as follows: —

[!] = That the identification has been verified by actual comparison of the specimens with that description which has been selected to serve as the standard authority for the particular form.

[?], [??] = Uncertainty as to the identification.

There are of course many particulars, which do not admit of expression in an abbreviated form by means of symbols, but which require to be written out at full length. In such cases it is however important

that attention shall be directed by an entry in the record sheets to the existence of such notes, and these may be made as follows: —

N 1, N 2, N 3, etc. = That fuller notes relating to the specimens will be found in the "Species Book". The appended numerals are part of the "Register Number" of the specimens, the "Reference Number" of the sample forming the remainder, by which "Register Number" the specimens if they are preserved can always be distinguished among the museum collections.

A few examples may now be given to illustrate the actual working of the system and to show the manner in which the symbols may be combined. For instance, we may find in various sections of the Record Books the following entries in that column bearing the Reference Number: 1907. 8. 24, B.: —

Plumularia pinnata + S1; ECvi-p; N 27.

Asterias glacialis + 3j.

- *rubens* + Ci-a; Svl; RF.

Nassa incrassata 0; E h [?].

The information which is actually furnished by the above abbreviated records is as follows. In the first place: the "Reference Number" indicates that the sample to which the records relate was the second one taken on the 24th of August 1907; and on turning to the "Collecting Form" for the sample, we obtain full details as to the precise position and depth at which the material was collected, the nature of the bottom, the kind of net used and the method in which it was worked, the length of haul, state of weather and tide, etc. etc. Returning to the Record Sheets, we see from the symbols relating to *Plumularia pinnata* that several large colonies of this hydroid were obtained in the haul; that gonophores were commonly present and in various stages of development, some being very immature while others were already empty; that there are further notes regarding the specimens in the "Species Book"; and that the specimens bear the "Register No." 1907. 8. 24, B. 27. in the museum. Similarly we note that *Asterias glacialis* was represented in the sample by but three young examples; while *A. rubens* was common in all stages from the immature to adult condition; that several very large specimens were obtained; also that the gonads were ripe in a few cases. Finally, while no examples of *Nassa incrassata* were observed, egg-capsules which certainly belonged to this species, were present in the sample; and the veligers were hatching out from the capsules.

The net result of this system of recording is that the records are entered in the Record Books in such a manner that a summary of all the information which has been obtained during the whole time the

survey has been in operation, is kept together and in such a form that it is always available for immediate reference. Thus: all the information which has accumulated regarding any one particular species may be seen almost at a glance by tracing out the proper horizontal line of entries in the Record Book; and similarly, the full analysis of any particular dredging or other sample of material may be readily obtained by reference to the appropriate vertical column; while finally, as the records are entered in the Record Book in order of date, and as the Reference Number of each sample gives also the actual date on which the sample was collected, it becomes extremely easy to follow out any seasonal changes which may take place, such for example as breeding periods, or times of migration. By this system it is not at all necessary that the whole sample shall be entirely worked through and fully recorded at one time and without interruption. On the contrary, not only can any further records or supplementary details be added at any subsequent time; but these can moreover be interpolated in their correct places in the Record Books, provided that a column has been duly set apart for the recording of the particular batch of material. It should be remarked that stray records, for which by any oversight a column may not have been reserved in its proper place, should be entered on record sheets specially provided for such entries and placed at the end of each section of the file: in this way, the strict chronological sequence of the bulk of the records will not be disturbed.

11. Das mechanische Sammeln als wissenschaftliche Forschungsmethode.

Von Prof. Dr. Friedr. Dahl, Steglitz-Berlin.

eingeg. 12. Oktober 1907.

In einem Aufsatz dieser Zeitschrift (Bd. 31. S. 917) behauptete ich, daß meine mechanische Sammelmethode von vielen nicht verstanden sei: Ich wollte damit keinem einen Vorwurf machen, sondern nur andeuten, was mich bewege, die Grundgedanken der Methode noch einmal klar hervorzuheben.

Ein Aufsatz von L. Reh (S. 189—191 des vorliegenden Bandes dieser Zeitschrift) zeigt mir, daß ich mich nicht geirrt habe, und daß man mich auch heute noch nicht verstanden hat. Ich muß also versuchen, mich noch klarer auszudrücken.

Meinen **ersten Grundsatz** daß ich beim Sammeln alles ohne Auswahl mitnehme und aufhebe, hat man verstanden, nicht aber meinen **zweiten Grundsatz** der ebenso wichtig als der erste und von diesem ganz untrennbar ist, daß ich meine Fänge im weitesten Maße variiere. — So sammle ich, um nur ein Beispiel zu nennen, von

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Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

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