Bulletin de la Société belge de Géologie	T. 93	fasc. 3	pp. 297-299	Bruxelles 1984
Bulletin van de Belgische Vereniging voor Geologie	V. 93	deel 3	blz. 297-299	Brussel 1984

AN IMPROVED METHOD OF CODING DIATOM DATA FOR COMPUTER UTILISATION

by L. DENYS (*) & E. LODEWIJCKX (**)

SUMMARY. - An improved and more complete computer code for the use of diatom data in the reconstruction of past sedimentary environments is proposed.

INTRODUCTION.

The use of diatom assemblages for paleoecological purposes implies tedious calculations as usually the numerous taxa encountered in the examined deposits have to be grouped according to certain classifications in order to obtain more easily interpretable data. Recently a numerical coding system for the autecological data from diatoms used in the reconstruction of paleoenvironments by the Geological Survey of the Netherlands has been published (H. DE WOLF, 1982). This system offers a rapid method of processing diatom data by means of a computer. For the handling of such data in a research project on the Quaternary development of the western Belgian coastal plain, a similar system had been developed which however offers some advantages.

THE CODE.

As DE WOLF's code, our system consists of a species code followed by an environmental code.

THE SPECIES CODE.

The species code is formed by two parts : one for the genus name and one for the species, variety or form epithet. Both are three digits long in our study. The taxa are listed alphabetically under each genus. When for instance the genus *Achnantes* is given the code number 002, the species *Achnantes exigua* may have 002006 as its code number and its variety *heterovalvata* 002007. This considerably facilitates the use of the compilation lists and enables a very simple calculation of the genus totals.

THE ENVIRONMENT CODE.

The environment code differs in several points from that of DE WOLF :

- several classifications are added,
- intermediate categories are introduced when necessary,
- some classifications are slightly changed.

The resulting code is composed of fourteen numbers with maximum two digits each which indicate the organism's place in as many ecological classifications. These are the following :

1. The salinity spectrum of A. VAN DER WERFF & H. HULS (1957-1974) :

1. marine	7. brackish
2. marine/marine-brackish	8. brackish/brackish-fresh
3. marine-brackish	9. brackish-fresh
4. marine-brackish/brackish-marine	10. brackish-fresh/fresh-brackish
5. brackish-marine	11. fresh-brackish
6. brackish-marine/brackish	12. fresh-brackish/fresh
	13. fresh

2. The salinity classification according to F. HUSTEDT (1953) :

1. polyhalobious
2. mesohalobious
3. oligohalobious halophile
4. oligohalobious indifferent
5. halophobous

(*) Holder of an I.W.O.N.L. specialisation grant.
Dienst Algemene Plantkunde, R.U.C.A., Groenenborgerlaan 171, B-2020 Antwerpen.
(**) Dienst voor Biologische Antropologie en Sociale Biologie,
R. U. G., St-Pietersnieuwstraat 39, B-9000 Gent.

3. The salinity tolerance spectrum of R. SIMONSEN (1962) :

1. polyhalobious stenohaline
2. polyhalobious oligoeuryhaline
3. polyhalobious meioeuryhaline
4. polyhalobious mesoeuryhaline
5. polyhalobious pleioeuryhaline
6. mesohalobious euryhaline
7. mesohalobious holoeuryhaline
8. oligohalobious oligoeuryhaline
9. oligohalobious meioeuryhaline
10. oligohalobious mesoeuryhaline
11. oligohalobious pleioeuryhaline
12. halophobous

4. The width of the salinity range, which may provide information on possible short-term salinity variations :

1. euryhaline
2. ± euryhaline
3. stenohaline

5. The life-form categories :

1. planktonic
2. planktonic-benthic
3. benthic
4. benthic-sessile
5. sessile
6. planktonic-benthic-sessile
7. sessile-planktonic

In contrast to DE WOLF's code the categories aerophilous and eu-terrestrial are not included in this spectrum. They are listed separately in a habitat spectrum. Generally it is preferable not to list the genera *Fragilaria* and *Paralia* in the above classification as they represent special cases and are often very abundant (e.g. U. MILLER, 1964).

6. The pH classification of F. HUSTEDT (1939) :

1. alkalibiontic
2. alkaliphilous
3. circumneutral (indifferent)
4. acidophilous
5. acidobiontic

7. The nutrient content spectrum :

1. eutrophic
2. eutrophic-mesotrophic
3. mesotrophic
4. mesotrophic-oligotrophic
5. oligotrophic

8. The habitat classification :

1. aquatic
2. aerophilous
3. eu-terrestrial

9. The tolerance of tidal stress according to R. SIMONSEN (1962) :

1. pseudampotiphilous
2. tide-indifferent
3. ampotixenous
4. probably pseudampotiphilous
5. probably ampotixenous

10. The behaviour towards current :

1. rheophilous
2. indifferent
3. limnophilous

11. The dissolved oxygen requirements (B. J. CHOLNOKY, 1968) :

1. high oxygen demands
2. low oxygen demands
3. indifferent

12. The nitrogen uptake metabolism type (B. J. CHOLNOKY, 1968) :

1. heterotrophic
2. facultative heterotrophic
3. autotrophic

13. The saprobic character (V. SLADECEK, 1973) :

1. xenosaprobic
2. oligosaprobic
3. β-mesosaprobic
4. α-mesosaprobic
5. polysaprobic
6. xeno- to oligosaprobic
7. xeno- to β-mesosaprobic
8. oligo- to β-mesosaprobic
9. β- to α-mesosaprobic
10. α-mesosaprobic to polysaprobic

14. The temperature requirements :

1. warm
2. temperate
3. cold

If no information can be found on the place of a taxon with regard to a certain classification this is always indicated by a 0 code.

DISCUSSION.

An environmental code for diatoms may include a large number of parameters, for some of which it may be advisable to use several classifications simultaneously in certain cases. Further expansions can easily be introduced according to one's individual requirements (stratigraphic range, geographic distribution, tolerance towards certain substances, ...). For most contemporary research however the proposed code will amply suffice. Some of the classifications used herein have been critisised by certain workers (especially the current, nitrogen metabolism, saprobity and temperature classifications). For the moment it seems worthwile to retain them although their status might well be degraded further in the nearby future. It should however be kept in mind that classifications are mostly generalisations and that the ecological behaviour of organisms cannot be translated into rigid categories without loss of information. Nevertheless, the coding and thus categorisation of ecological data is indispensable for computer work. Also it can be hoped that the ease and rapidity which the computer offers for the processing of substantial data will lead to a better use of the available information by diatom paleoecologists.

ACKNOWLEDGEMENTS.

The authors wish to express their gratitude to Mr. H. DE WOLF (Geological Survey of the Netherlands, Haarlem) for

reviewing the manuscript draft and to Prof. Dr. D. K. FERGUSON (R.U.C.A.) for correcting the language of the definitive text.

REFERENCES.

CHOLNOKY, B. J. (1968) - Die Ökologie der Diatomeen in Binnengewässern. *J. Cramer Verlag, Vaduz*, 699 p.

DE WOLF, H. (1982) - Method of coding of ecological data from diatoms for computer utilization. *Med. Rijks Geol. Dienst, 36 (2)*, 95-98 + tab.

HUSTEDT, F. (1939) - Systematische und Ökologische Untersuchungen über die Diatomeen-Flora von Java, Bali und Sumatra. III. Die Ökologischen Faktoren und ihr Einflusz aud die Diatomeenflora. *Arch. f. Hydrobiol. Suppl. Bd., 16*, 274-344.

HUSTEDT, F. (1953) - Die Systematik der Diatomeen in ihren Beziehungen zur Geologie und Ökologie nebst einer Revision des Halobien-systems. *Sv. Bot. Tidskr., 47 (4)*, 509-519.

MILLER, U. (1964) - Diatom floras from the Quaternary of the Göta river valley. *Sveriges Geol. Unders. Avhandl. Ser. Ca, 44*, 1-67 + 8 pl.

SIMONSEN, R. (1962) - Untersuchungen zur Systematik und Ökologie der Bodendiatomeen der westlichen Ostsee. *Int. Rev. Ges. Hydrobiol. Syst. Beih., 1*, 8-144 + 4 pl.

SLÁDECEK, V. (1973) - System of water quality from the biological point of view. *Arch. f. Hydrobiol. Beih. Ergebn. Limnol., 7 (1-4)*, 1-128.

VAN DER WERFF, A. & H. HULS (1957-1974) - Diatomeeënflora van Nederland. *Reprint 1976, Otto Koeltz Science Publishers, Koenigstein.*

SOCIETE BELGE DE GEOLOGIE

(Association sans but lucratif)

C.C.P. 000-0145219-10

Rue Jenner 13
1040 BRUXELLES

Demande d'admission

Je soussigné (1) .....

.....

.....

demande mon admission comme membre effectif (2) de la Société Belge de Géologie à Bruxelles.

Je m'engage à en observer les statuts.

Date .....

Signature

Signatures des deux parrains :

(1) Nom, prénom, titre et adresse.
Pour les sociétés, indiquer la dénomination et le siège social et désigner les nom, prénom et titre d'un délégué.

(2) La cotisation, pour l'année 19..., est fixée à ... F.

Formulaire à renvoyer, dûment rempli et signé, à l'adresse de la Société.