

## A POSSIBLE CONTEMPORARY SYSTEM OF FRUIT TERMINOLOGY

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The carpological terminology adopted at present is totally inadequate from the point of view of evolutionary morphology and phylogenetic taxonomy. The majority of current terms, including the principal ones — capsule, berry, drupe and nucule — unites a great number of genetically heterogeneous fruits.

It is unnatural, for example, that the description “fruit - a loculicidal capsule” is applied at the same time to Cistaceae, Parnassiaceae, Pyrolaceae, Scrophulariaceae, Liliaceae and Iridaceae; the description “fruit - a capsule” — to Oxalis, Andromeda, Primulaceae, Saxifraga, Orchidaceae, etc. If one considers their origin, development and structure, they have nothing in common other than a very approximate external resemblance. They differ from one another in arising from a syncarpous, paracarpous or lysicarpous gynoecium, from a superior, semi-inferior or inferior ovary, in the number of constituting carpels, in the mode of dehiscence, and so on.

Some botanists hold the opinion that one can continue employing the above-mentioned terms for fruit types for the purpose of taxonomy and that a really genetical classification needs to be worked out only for the purpose of morphology. It is impossible to agree with this, just as it would be impossible in contemporary taxonomy to use, for example, simplified notions of the anatomical structure of the stem or of pollen morphology, instead of the latest achievements of anatomy and palynology. Fruit terminology must be common for evolutionary morphology and for phylogenetic-taxonomy.

In the attempts made so far to formulate a new and adequate terminology for fruits we meet with several trends:

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1. A revival of forgotten or half-forgotten names of fruit types, for example, cynarrhodium, coenobium, rhegma (Takhtadjan, 1959; Kaden, 1964). These, however, have been given only to sharply distinguished fruits and are few in number. They are inadequate for a division of capsules and drupes into genetically uniform units.

2. A construction of new terms on the basis of formerly employed names by the addition of numerals and adverbs, for example, unifollicle, quinquefollicle, multifollicle, uninucle, quadrinucle, etc. (Kaden, 1950). This is also totally useless for coenocarpous fruits.

3. A more precise definition of heterogeneous concepts by the addition of epithets to the terms denoting them, for example, "superior paracarpous capsule", "inferior syncarpous drupe" etc. (Takhtadjan, 1959). These types, however, remain heterogeneous even when used in this restricted sense. Thus, representatives of Oxalidaceae, Balsaminaceae, Malvaceae, Ericaceae and many other families have "a superior syncarpous capsule". Further development of this method leads to long sentences difficult to remember, but not to names. For example, Baumann-Bodenheim (1954: 109) gives the following characteristic for the fruit of *Hedera helix* L.: "Form type: Strato-Capsula gamo-marginalis, isocarpellata, integri-laminalis, margo= et apice-placentalis: ± isosperma. Pericarpium baccaceum, achlamydocarpum, asyncarpum. Dehiscence type: "Clausicarpium".

None of the attempts enumerated above eliminate another grave defect of existing carpological terminology: an absence of any system in it that would make it possible to coin a new term for a fruit type established as new by a morphologist or taxonomist.

Therefore one may say with certainty that contemporary morphogenetical carpology has not at present a sufficiently complete, convenient and easily remembered terminology. Nevertheless we think it possible to create a system of terminology for fruit types in the spirit of ICBN. However, it will demand serious efforts from taxonomists, since it is necessary to dismiss the incorrect idea of there being only some dozens of fruit types in nature.

For the denomination of a fruit type we propose the addition of a constant lexical element "=carpium" to the stem of the name of the typical genus. For example, all the representatives of Asteraceae in the limits of "Flora Europaea" will have the fruit "asterocarpium" with subtypes: a. immersum (*Xanthium*), a. involuclatum (*Echinops*) and a. non involuclatum (others); all the representatives of Apiaceae — the fruit "apiocarpium" with subtypes: a. drupaceum (*Hydrocotyle*), a. macrocalyca-tum (*Eryngium*), a. ecolumnare (*Sanicula*), a. columnare (*Apioideae*).

We find the following fruit types and subtypes in the first volume of "Flora Europaea".<sup>1)</sup>

| <i>Families</i> | <i>Genera and species</i> | <i>Fruit types and subtypes</i> |
|-----------------|---------------------------|---------------------------------|
| Aizoaceae       | Aizoon                    | Aizoocarpium                    |
|                 | Carpobrotus               | Carpobrotocarpium               |
|                 | Mesembryanthemum          | Mesembryanthemocarpium          |
|                 | Aptenia                   | — pentamerum                    |
|                 | Sesuvium                  | — tetramerum                    |
| Alsineaceae     | Sesuvium                  | Sesuviocarpium                  |
|                 | Alsine segetalis          | Alsineocarpium                  |

<sup>1)</sup> The sequence of families is alphabetical. Some families in the "Flora Europaea" have been subdivided and renamed in accordance with modern practice and ICBN. Only examples of genera and species are given for each fruit type and subtype in the list.

| <i>Families</i>  | <i>Genera and species</i> | <i>Fruit types and subtypes</i> |
|------------------|---------------------------|---------------------------------|
|                  | <i>Spergula</i>           | Cerastiocarpium                 |
|                  | <i>Myosoton</i>           | — pentamerum disjunctivum       |
|                  | <i>Spergula linicola</i>  | — — disjunctive dorsicidum      |
|                  | <i>Sagina procumbens</i>  | — — indehiscens                 |
|                  | <i>Moenchia erecta</i>    | — tetramerum disjunctivum       |
|                  | <i>Minuartia</i>          | — — disjunctive dorsicidum      |
|                  | <i>Stellaria</i>          | — trimerum disjunctivum         |
|                  | <i>Bufonia</i>            | — — disjunctive dorsicidum      |
|                  | <i>Pseudostellaria</i>    | — dimerum disjunctivum          |
|                  |                           | — — disjunctive dorsicidum      |
| Amaranthaceae    | <i>Amaranthus</i>         | Amaranthocarpium                |
|                  | — <i>albus</i>            | — dehiscens                     |
|                  | — <i>lividus</i>          | — indehiscens                   |
|                  | <i>Celosia</i>            | — polyspermum                   |
| Aristolochiaceae | <i>Aristolochia</i>       | Aristolochiocarpium             |
|                  | <i>Asarum</i>             | Asarocarpium                    |
| Basellaceae      | <i>Basella</i>            | Basellocarpium                  |
| Berberidaceae    | <i>Berberis</i>           | Berberidocarpium                |
|                  | <i>Epimedium</i>          | Epimediocarpium                 |
|                  | <i>Leontice</i>           | Leontiocarpium                  |
| Betulaceae       | <i>Betula</i>             | Betulocarpium                   |
| Brassicaceae     |                           | Alyssocarpium                   |
|                  | <i>Alyssum</i>            | — bivalvatum                    |
|                  | <i>Biscutella</i>         | — didymum                       |
|                  | <i>Boleum</i>             | — articulatum                   |
|                  | <i>Carrichtera</i>        | — articulatum bivalvatum        |
|                  | <i>Cardaria</i>           | — indehiscens                   |
|                  | <i>Neslia</i>             | — nuculiforme                   |
|                  |                           | Brassicocarpium                 |
|                  | <i>Brassica</i>           | — bivalvatum                    |
|                  | <i>Chorispora</i>         | — craspediiforme                |
|                  | <i>Raphanistrum</i>       | — articulatum                   |
|                  | <i>Raphanus</i>           | — indehiscens                   |
| Cannabaceae      | <i>Cannabis</i>           | Cannabocarpium                  |
| Capparaceae      | <i>Capparis</i>           | Capparocarpium                  |
|                  | <i>Cleome</i>             | Cleomocarpium                   |
| Ceratophyllaceae | <i>Ceratophyllum</i>      | Ceratophyllocarpium             |
| Chenopodiaceae   | <i>Beta</i>               | Betocarpium                     |
|                  | — <i>trigyna</i>          | — trimerum                      |
|                  | — <i>vulgaris</i>         | — dimerum                       |
|                  |                           | Chenopodiocarpium               |
|                  | <i>Agriophyllum</i>       | — velatum                       |
|                  | <i>Anabasis</i>           | — succosum                      |
|                  | <i>Chenopodium</i>        | — tunicatum                     |
|                  | <i>Salicornia</i>         | — semiimmersum                  |
|                  | <i>Spinacia</i>           | — tetramerum                    |
| Corylaceae       |                           | Corylocarpium                   |
|                  | <i>Corylus avellana</i>   | — basi involucreatum            |
|                  | — <i>colurna</i>          | — involucreatum                 |

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|-----------------|---------------------------|---------------------------------|
|                 | <i>Ostrya</i>             | — semiinvolucratum              |
| Crassulaceae    | <i>Bryophyllum</i>        | Crassulocarpium                 |
|                 | <i>Crassula tillaea</i>   | — tetramerum                    |
|                 | <i>Jovibarba</i>          | — trimerum                      |
|                 | <i>Sempervivum</i>        | — hexamerum                     |
|                 | <i>Umbilicus</i>          | — polymerum                     |
| Cynomoriaceae   | <i>Cynomorium</i>         | — pentamerum                    |
| Droseraceae     |                           | Cynomoriocarpium                |
|                 | <i>Aldrovanda</i>         | Droserocarpium                  |
|                 | <i>Drosera</i>            | — pentamerum                    |
| Escalloniaceae  | <i>Escallonia</i>         | — trimerum                      |
| Fagaceae        |                           | Escalloniocarpium               |
|                 | <i>Castanea</i>           | Fagocarpium                     |
|                 | <i>Fagus</i>              | — hexamerum                     |
|                 | <i>Quercus</i>            | — trimerum                      |
| Fumariaceae     |                           | Quercocarpium                   |
|                 | <i>Corydalis</i>          | Corydalocarpium                 |
|                 | <i>Fumaria</i>            | — bivalvatum                    |
| Grossulariaceae | <i>Ribes</i>              | — indehiscens                   |
| Hydrangeaceae   |                           | Grossulariocarpium              |
|                 | <i>Deutzia</i>            | Philadelphocarpium              |
|                 | <i>Philadelphus</i>       | — trimerum                      |
| Illecebraceae   |                           | — tetramerum                    |
|                 | <i>Corrigiola</i>         | Herniariocarpium                |
|                 | <i>Herniaria</i>          | — trimerum                      |
|                 | <i>Illecebrum</i>         | — dimerum                       |
|                 | <i>Scleranthus</i>        | Illecebrocarpium                |
| Juglandaceae    |                           | Scleranthocarpium               |
|                 | <i>Carya</i>              | Juglandocarpium                 |
|                 | <i>Juglans</i>            | — quadrivalvatum                |
|                 | <i>Pterocarya</i>         | — rumpens                       |
| Lauraceae       | <i>Laurus</i>             | Pterocaryocarpium               |
| Loranthaceae    | <i>Arceutobium</i>        | Laurocarpium                    |
|                 | <i>Loranthus</i>          | Arceutobiocarpium               |
| Magnoliaceae    | <i>Liriodendron</i>       | Loranthocarpium                 |
|                 | <i>Magnolia</i>           | Liriodendrocarpium              |
| Molluginaceae   |                           | Magnoliocarpium                 |
|                 | <i>Glinus</i>             | Molluginocarpium                |
|                 | <i>Mollugo</i>            | — pentamerum                    |
| Moraceae        | <i>Morus</i>              | — trimerum                      |
| Myricaceae      | <i>Myrica</i>             | Morocarpium                     |
|                 | — <i>carolinensis</i>     | Myricocarpium                   |
|                 | — <i>gale</i>             | — drupaceum                     |
| Nelumbonaceae   | <i>Nelumbo</i>            | — nuculiforme                   |
| Nyctaginaceae   | <i>Mirabilis</i>          | Nelumbonocarpium                |
| Nymphaeaceae    | <i>Nuphar</i>             | Mirabilocarpium                 |
|                 | <i>Nymphaea</i>           | Nupharocarpium                  |
| Paeoniaceae     | <i>Paeonia</i>            | Nymphaeocarpium                 |
|                 |                           | Paeoniocarpium                  |

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|-----------------|---------------------------|---------------------------------|------------------|
| Papaveraceae    | Argemone                  | Argemonocarpium                 |                  |
|                 | Chelidonium               | Chelidoniocarpium               |                  |
|                 |                           | Glaucocarpium                   |                  |
|                 | Glaucium                  | — bivalvatum                    |                  |
|                 | Hypecoum erectum          | — craspediiforme                |                  |
|                 | — pendulum                | — indehiscens                   |                  |
|                 | Papaver                   | Papavercarpium                  |                  |
| Parnassiaceae   | — rhoeas                  | — dehiscens                     |                  |
|                 | — somniferum              | — indehiscens                   |                  |
|                 | Parnassia                 | Parnassiocarpium                |                  |
|                 | Phytolacca                | Phytolaccocarpium               |                  |
| Pittosporaceae  | Pittosporum               | Pittosporocarpium               |                  |
|                 | — crassifolium            | — tri-tetramerum                |                  |
|                 | — undulatum               | — dimerum                       |                  |
| Platanaceae     | Platanus                  | Platanocarpium                  |                  |
| Polygonaceae    |                           | Polygonocarpium                 |                  |
|                 | Calligonum                | — tetramerum                    |                  |
|                 | Fagopyrum                 | — trimerum velatum              |                  |
|                 | Polygonum                 | — — tunicatum                   |                  |
|                 | Koenigia                  | — dimerum                       |                  |
|                 | Portulacaceae             | Montia                          | Montiocarpium    |
|                 |                           | Portulaca                       | Portulacocarpium |
|                 | Proteaceae                | Hakea                           | Hakeocarpium     |
|                 | Rafflesiaceae             | Cytinus                         | Cytinocarpium    |
|                 | Ranunculaceae             | Actaea                          | Actaeocarpium    |
| Aquilegia       |                           | Aquilegiocarpium                |                  |
|                 |                           | Consolidocarpium                |                  |
| Callianthemum   |                           | — monospermum                   |                  |
| Consolida       |                           | — polyspermum                   |                  |
| Helleborus      |                           | Helleborocarpium                |                  |
|                 |                           | Nigelloarpium                   |                  |
| Garidella       |                           | — trimerum                      |                  |
| Nigella         |                           | — pentamerum                    |                  |
|                 |                           | Ranunculocarpium                |                  |
| Hepatica        |                           | — velatum                       |                  |
| Ranunculus      |                           | — polymerum                     |                  |
| Thalictrum      |                           | — oligomerum                    |                  |
|                 |                           | Trolliocarpium                  |                  |
| Caltha          |                           | — oligomerum                    |                  |
| Trollius        |                           | — polymerum                     |                  |
| Resedaceae      |                           | Reseda                          | Resedocarpium    |
|                 | Sesamoides                | Sesamoidocarpium                |                  |
| Salicaceae      |                           | Salicocarpium                   |                  |
|                 | Populus deltoides         | — tri-tetramerum                |                  |
| Santalaceae     | Salix                     | — dimerum                       |                  |
|                 |                           | Santalocarpium                  |                  |
| Sarraceniaceae  | Osyris                    | — succosum                      |                  |
|                 | Thesium                   | — siccum                        |                  |
|                 | Sarracenia                | Sarraceniocarpium               |                  |

| <i>Families</i> | <i>Genera and species</i> | <i>Fruit types and subtypes</i> |
|-----------------|---------------------------|---------------------------------|
| Saxifragaceae   | <i>Bergenia</i>           | Bergeniocarpium                 |
|                 | <i>Chrysosplenium</i>     | Chrysospleniocarpium            |
|                 | <i>Saxifraga</i>          | Saxifragocarpium                |
|                 | — <i>hirculus</i>         | — superum                       |
| Silenaceae      | — <i>hieracifolia</i>     | — semiinferum                   |
|                 |                           | Dianthocarpium                  |
|                 | <i>Agrostemma</i>         | — pentamerum                    |
|                 | <i>Cucubalus</i>          | — indehiscens                   |
|                 | <i>Dianthus</i>           | — dimerum                       |
|                 | <i>Drypis</i>             | — pyxidiiforme                  |
|                 | <i>Elisanthe</i>          | — trimerum                      |
|                 |                           | Silenocarpium                   |
|                 | <i>Silene</i>             | — trimerum                      |
|                 | <i>Vaccaria</i>           | — dimerum                       |
| Tetragoniaceae  | <i>Viscaria</i>           | — pentamerum                    |
|                 | <i>Tetragonia</i>         | Tetragoniocarpium               |
| Ulmaceae        |                           | Celtidocarpium                  |
|                 | <i>Celtis</i>             | — succosum                      |
| Urticaceae      | <i>Zelkova</i>            | — siccum                        |
|                 | <i>Ulmus</i>              | Ulmocarpium                     |
|                 | <i>Urtica</i>             | Urticocarpium                   |

Thus we have 84 fruit types for 49 families. Such a number of fruit names may seem alarmingly large, but it will be considerably less than a thousand for all the Angiosperms of the world. Moreover, these names are much more easy to remember than the equally numerous “many-storeyed” denominations to which the contemporary evolutionary carpology is obliged to resort in order to distinguish genetically uniform types.

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