and Dr. John Palmer of the Forest Disease Laboratory very kindly read and criticised the manuscript.

REFERENCES

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Floral Ecology* The first edition of Kugler's "Blütenökologie" was published in 1955 and represented the first comprehensive compilation of the subject since Knuth's "Handbuch der Blütenbiologie". Since then there has been much progress in the development of flower ecology. One can recall the new knowledge about scent-gathering bees, pollination by bats, or the research on the UV-patterns on flowers. The publishing of the second edition was urgently needed in order that the mere botanist or interested layman might see the problems and the recent position of flower ecology resulting from the multitude of contributions in botanical and zoological literature.

The results of "sense physiology" and "Verhaltensforschung" of the pollinators and of plant physiology and morphology have naturally been placed in the foreground. It is very satisfactory that in all subjects, every speculative viewpoint has been completely omitted; for example, in the last chapter "Evolution of Pollination", evolution from the primary "Windblütler" to the more specialized forms has been shortly and carefully dealt with without much reference to "Stilelemente" or "Gestalttypen". The author warns us again and again of too hasty conclusions and points out that until there are unequivocal answers further research must be done in many cases.

Floral morphologists of previous years often erroneously interpreted pollination mechanisms through lack of enough criticism and too teleological a viewpoint. Recent experimental flower ecology as well as physiological investigations have widened largely the horizons of our knowledge of pollination mechanisms through causal-analytical methods. Flower ecology has become in fact a valid field of research together with other branches of botany.

A few critical observations are however needed. The opinions expressed about some of the classical flower biologists, especially K. Sprengel, are rather one-sided. Sprengel, in fact, was not all that speculative; the only illustration from Sprengel's classical work, without any explanation, is not in the correct place. The third phase of flower ecology, the experimental phase, did not first begin with the works of V. Frisch and his school as is suggested, yet the results of this school stand rather in the foreground. On page 238 the author himself has been a victim of misinterpretation of morphological functions. Species of *Campanula* are not autogamous throughout, although the bending down of the stigma which thus comes in touch with the pollen on the style may be interpreted as an indication of autogamy. All *Campanula* species hitherto studied are mostly allogamous. Plain but instructive drawings, (sometimes too simple), many photographs and a thorough literature index supplement the text.

J. DAMBOLDT

* Kugler, Hans. Blütenökologie, second revised and enlarged edit., 347 illustr., 345 pp., Gustav Fischer Verlag, Stuttgart. 1970. 48 DM.