(Figs. 35, 36) and three, two or one in *Dalechampia*. These male flowers have an absciss layer below the perianth. They are borne in complex inflorescences capable of a second cycle of reduction, which may lead from a flower of the *Mercurialis* type to one with three perianth lobes and one stamen (Fig. 37) and thence to the unistaminate male flower of *Euphorbia* (Fig. 38) with no perianth, but an absciss layer in the middle of its stalk[14].

Reduction of an androphyll of the *Ricinus* type could take two other paths. In one, the compound branches would be reduced to single stamens, so producing a blade with a variable number of simple stamens distributed over its surface. A whorl of five of these relatively primitive structures fuse together to form the sepals and perigynous cup of the Rosaceae (Fig. 34). The petals in this family are sterile structures, probably evolved from androphylls of the same kind. The second type of reduction leads to an androphyll bearing in a median position on its surface a single dichotomous branch system, each branchlet terminated by a stamen. This condition occurs in the Tiliaceae (Fig. 29) and Malvaceae (Fig. 30), where the stamens are grouped in dichotomous systems attached to the petals, with filaments free in the one and adnate with those of adjacent petals into a column in the other. Either of these types of androphyll could lead by further reduction to a single epipetalous stamen, as in *Rhamnus* (Rhamnaceae) (Fig. 31) and finally to a single aphyllous stamen attached at a 'leaf-gap' to the floral axis, as in *Ranunculus* (Fig. 32).

The vascular structure of the flower provides evidence for a number of evolutionary lines within the Angiosperms. The primary diversification of the pre-angiosperm stock appears to have taken place during its gymnospermous phase in the late Carboniferous or early Permian. Many Angiosperm lineages must date back to this period as distinct lines of evolution, so that, in this sense, the Angiosperms are polyphyletic. Already the new theory is throwing much light on Angiosperm phylogeny. The great disparity between the floral vascular systems of Ranunculaceae and Magnoliaceae, indicating an origin from widely divergent modifications of the gonophyll structure, implies a very ancient separation of these stocks. A number of other lineages must be as old.

From its mode of origin it might be anticipated that derivatives of the gonophyll would be found in parts of the plant other than the gynæcium and andræcium. Reference has been made above to staminodal nectaries, but the nectarial flap of the *Ranunculus* petal is not obviously of this origin. It is often provided with a vascular trace[15], which is opposed to the petal trace, as it would be if it had originated from an epiphyllous branch. The petal of *R. gunnianus* Hook. has several nectarial flaps, which indicates the probable origin of the *Ranunculus* petal from an androphyll of the rosaceous type (Fig. 34). Other structures with opposed vascular systems are the coronas of the perianth of *Narcissus*[16] and of the sepals and petals of *Passiflora*[17]. In the latter, the vascular system of the corona is often elaborately dichotomous and apparently little altered from that of its gonophyll precursor.

The flower and inflorescence are both condensation products of the primitive gonophyll of gonophylls. As in the flower, condensation of the inflorescence has taken many paths. Sometimes evidence of the epiphyllous origin of the fertile branch is retained in the attachment of the flower to some part of the vascular system of its bract (Epacridaceae, Proteaceae). The compound female inflorescence of *Dobinea delavayi* Baill. (Anacardiaceae)[18] provides a striking example in which the individual flowers are attached to the centre of a rounded dentate bract reminiscent of the fertile scale of *Glossopteris* (*Scutum*). Allusion has been made already to the occurrence of epiphyllous inflorescences in a number of families. DeCandolle's study[8] of the Chailletiaceae indicated that the epiphyllous inflorescence of this family is not adnate to the leaf, but is part of it and that all stages in the detachment of the inflorescence from its leaf occur, leading to the axile position. Similar evidence is to be found in other families.

In this brief summary of the gonophyll theory it has been possible to cite comparatively few examples. It is hoped, however, that enough has been said to illustrate the scope of the theory in explaining not only the gynæcium but also other parts of the flower and the inflorescence. Many facts that formerly appeared to be anomalous in the context of the carpel theory now fall naturally into place. For the first time it is possible to indicate a link between the reproductive structures of *Gnetum* and those of Angiosperms and to point out similarities between those of *Glossopteris* and the andræcium of certain Angiosperms.

In conclusion, it is my pleasure to acknowledge the help of my daughter, Mrs. F. A. Wrigley, in making preparations for the study of the gynæcium, and of my colleagues at the Royal Botanic Gardens, Kew, for many stimulating discussions and for directing my attention to relevant plants and literature.

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OBITUARIES

Dr. C. E. Kenneth Mees, F.R.S.

WITH the death of Dr. C. E. Kenneth Mees on August 16, at Honolulu, Hawaii, at the age of seventy-eight, the world has lost a major pioneer of industrial research. To-day industrial research is fashionable, and many good scientists are attracted to it. Things were very different in 1906 when Dr. Mees joined the small firm of Wratten and Wainwright, makers of photographic plates. He had just emerged from a brilliant university career with degrees of B.Sc. and D.Sc., both by thesis in collaboration with Samuel E. Sheppard under Sir William Ramsay of University College, London. Sheppard adopted the more usual course and went to Germany to continue academic research, though he rejoined his old colleague later to continue an association which lasted throughout Sheppard's life. Mees turned to industry for reasons which he afterwards stated to be political. The son of a Wesleyan minister, he was a Fabian who realized that an equal sharing of wealth, while effectively depriving the rich, would do little to benefit the poor. What was needed was a general increase in the standard of living, and this he believed could be achieved only by the application of science to industry. An experience from the Wratten and Wainwright days can now be seen to epitomize what he considered should be the objectives of industrial research. Mr. Wratten had told him that plate prices were being cut, profits were diminishing and that he must devote his energies to reducing their manufacturing cost. Mees completely ignored these instructions. The blue-sensitive plates of the day were being bathed by the user in solutions of dyes to make them sensitive to longer wave-lengths. He found out how to incorporate this step during manufacture and proceeded to market outstandingly good panchromatic plates at a premium price with great benefit to the Company's profits. Throughout his subsequent career he was always aiming to open up new markets with new products ; others could worry about holding existing markets. In another way these early years in industry set the pattern of what was to come, in that despite his many preoccupations with commercial problems, he found time to publish several scientific papers of importance.

He had made himself so indispensable to Wratten and Wainwright's that when, in 1912, George Eastman wanted his services in order to found a research laboratory, he had to purchase the Company. His subsequent career with the Eastman Kodak Co. continued until he retired in 1955, seeing him appointed a director in 1923 and vice-president in charge of research in 1934. He became internationally recognized as a pioneer in industrial research and a great exponent of it. The reputation of his laboratory in Rochester, New York, grew by his insistence on high standards and on the publication of the results of research. The decision whether to publish or not was based on the principle that results of value to science ought to be published. This was in line with his belief that industry should repay its debt to pure science, in accordance with which belief he undertook to supply special—and unprofitable—plates to astronomers and started the manufacture of Eastman organic chemicals when the United States was cut off from German supplies during the First World War—a service still valued by organic chemists everywhere. He established research laboratories in the Company's subsidiaries in England and in France and was a frequent visitor to Europe.

Mees's influence on the commercial success of the Company was equally great, and he was largely responsible for such outstanding contributions as the introduction of amateur cinematography and for the popularization of colour photography in all its forms. Of his personal work, apart from many scientific papers, must be mentioned one of the earliest books on the organization of industrial research, published in 1920, which was brought up to date much later by the publication in collaboration with John A. Leermakers of "The Organization of Industrial Scientific Research". His greatest contribution to scientific literature was the "Theory of the Photographic Process" (1954), which had its origins in the book published in collaboration with Sheppard based on their research theses in 1907 which became known simply as "Sheppard and Mees". Recognition of his work was made plain by his receiving from almost every scientific body connected with photography their highest awards, by his election to the fellowship of the Royal Society (1939) and to membership of the U.S. National Academy of Sciences on becoming an American citizen in 1950.

Perhaps Mees's outstanding characteristic was his insistence on the importance of facts and his ability to analyse their implications. It was for this reason that in debate he could be a devastating opponent, but if it could be shown that the facts were against him he cheerfully accepted, not defeat, but the new circumstances. Mees usually dominated any group in which he found himself, mainly by the clarity with which he saw any problem (and the solution to it) and the consequent forcefulness with which he could express himself. He once gave the advice to one of his men, who was writing a book : "If you don't know for certain, don't say it ; if you must say it, be dogmatic !" He was widely read, an authority on many subjects, ranging from astronomy to the history of ancient Egypt, having as a central theme the growth of science and technology through the ages. This interest led to the publication in 1946 of "The Path of Science", written in conjunction with John R. Baker. He was a brilliant lecturer, as those who remember his Royal Institution Christmas lectures in 1935 will know, and a stimulating conversationalist. His views on the organization of industrial research were widely sought by other directors of research and by industrialists. They can well be summed up as insistence on the importance of the individual. He had no use for the idea that research had to become a team effort, and he believed that the youngest of men could do worth-while research if given the opportunity, as he had indeed proved in his own case. He surrounded himself by many brilliant individualists, gave them the freedom such men require, and regarded his job as the protection of these men from the direction of others rather than the direction of their work by himself. He asked the Company to judge by the end-results. It had no regrets.

Mees married in 1909 Alice Crisp (she died in 1954), by whom he had a son and a daughter.

E. R. DAVIES

Dr. R. C. Farmer, O.B.E.

THE death of Dr. R. C. Farmer on July 30 at the age of eighty-two has removed one of the great pioneers from the world of military explosives. He was well known not only for his contributions to the defence of the State but also for his publications, which appeared over a number of years in scientific journals. It is remarkable that his last three papers were printed in the *Journal of the Chemical Society* when he was within a few weeks of eighty-two. He married, in 1908, Maud Mary, daughter of Mr. T. T. Sharpe, of Liverpool, and had two sons and one daughter, all of whom have taken up scientific work.

Robert Crosbie Farmer was born on November 30, 1877, in Liverpool, where he received his early education and later graduated with first-class honours at the University. With the aid of scholarships he studied at Würzburg under Hantzsch and Röntgen, and was awarded the Ph.D. (*summa cum laude*) for