BOTANY

NATURE RAMBLINGS
by Frank Thone

A Successful Family

➤ SUMMER, especially late summer, is the high burgeoning time for that great family of flowering plants that face the sun with myriad small images of himself, the Compositae. Sunflowers—half-a-hundred species of them—daisies, asters, goldenrods, compass-plants, coneflowers, blazing-stars, thistles, dandelions and scores of other bright flower-heads shine boldly back at the summer sky with the summer sky's own colors, gold and blue.

If numbers of species and variety of forms are criteria of success in the plant world, this is the most successful of all plant families. There are well over 13,000 described species, distributed among a couple of hundred genera. Members of the family flourish from the polar regions to the tropics, from swamps to deserts, from sea level to high alpine meadows.

Most of them are of non-woody, herbaceous habit; a moderate number are shrubs. Very few of the composites can be classified as trees, and these are only small trees, growing in restricted and mostly out-of-the-way parts of the earth. This predominance of the herbaceous habit of growth is again evidence of a high degree of evolution, in the opinion of many botanists.

The flower structure of a composite is baffling to all beginning students of plant life. Equipped with the basal knowledge of the "typical" flower's parts—sepals, petals, stamens and pistil—they are left floundering the first time they dissect a dandelion or a daisy.

The secret is that a flower of a member of the composite family is exactly what the name implies: a composite structure. It isn't a single, simple flower, but a whole society of flowers, quite small ones, crowded closely side by side. The Compositae are among plants what bees, ants and termites are among insects—societies rather than individuals.

If you will split up one of these flower heads, you will find that the unit of floral structure is a small seed-forming body or pistil, made angular through crowding, that sits tight on a flat or convex base, the receptacle. It is very likely to have five stamens packed into a close ring. There may be no petals at all, but if petals are present they form a one-sided, strap-like affair, as in dandelions or thistles. A trace of the original five-petaled structure may be seen in five points at the outer ends of this strap.

In many composite flower heads most of the tiny flowers (florets, to be learned about it) have lost the strap-like corolla and are crowded together in a central disk. A row of florets around the margin produce much-enlarged petaloid structures, usually called rays. This arrangement is typical of such plants as sunflowers, coneflowers and daisies. Often the ray-florets are sterile, producing no seed; their job is to entice insects to their unpetaled but fertile sister florets of the disk—a division of labor again suggesting the cooperative life of the beehive or the anthill.

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ENGINEERING

Servo-Mechanism Control

➤ THE magnetic fluid clutch, a device using iron particles in oil developed by the National Bureau of Standards during the past year (*See SNL*, April 3, 1948, p. 211), has found an early application in a new, simple, automatic control for airplanes and other mechanisms, the control being known technically as a servo system.

This servo-mechanism is described in the REVIEW OF SCIENTIFIC INSTRUMENTS by E. S. Bettis and E. R. Mann of Oak Ridge, Tenn., scientists of the Fairchild Engine and Aircraft Corporation engaged on the so-called NEPA, or Nuclear Energy for Propulsion of Aircraft, project.

In this new magnetic clutch, for which Jacob Rabinow of the Bureau's staff is responsible, the fluid used is comprised of a carbonyl iron powder suspended in light oil, in the proportions of three parts of iron to one of oil by weight. When magnetized by the field of an electric coil, the iron particles form chains which unite the driving plate on the engine shaft with the driven plate, delivering the power to the mechanism.

Servo-mechanisms have been described as instruments to translate electronic "information" into appropriate action in purely mechanical equipment. Such devices are used for power steering of large trucks, tanks, steamships and airplanes. They are also used in high-speed electronic computers.

The possibility of applying this magnetic clutch to the solution of a servo problem is apparent, the REVIEW states. Simplicity of design and construction is one of its more practical advantages. In an operational sense, proportional power transmission control is possible with a relatively weak signal, and the system possesses inherent characteristics of high torque-inertia ratios, which offer short time responses. Advantage may therefore be taken of the system's momentum, to supply the peak power necessary for the rapid motion of large masses.

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ENGINEERING

Trucks and Buses Don't Need Special Gasolines

➤ TRUCKS and buses do not need special gasolines, experts now say. The fuel ordinarily used in passenger cars satisfactorily meets the anti-knock requirements of commercial motor vehicles, the Society of Automotive Engineers, meeting in Portland, Ore., was told in a report presented by a committee which made a special survey during the past year.

The survey disclosed that while commercial-vehicle engines have somewhat lower anti-knock requirements at high speed, and tend to rate the anti-knock value of sensitive fuels slightly lower than passenger-car engines, the fuel requirements of both types are quite similar. But proper adjustment of ignition systems is very important in the case of commercial vehicles.

The survey was made at scattered locations extending from Boston to San Francisco. Vehicles of different sizes and makes were used. They were tested both on reference fuels and commercial-type gasolines, first in the condition in which they were found, and again after new distributors had been installed, worn parts replaced, and ignition systems adjusted to manufacturers' specifications.

The report was prepared jointly by J. A. Edgar, Shell Oil Co., Martinez, Calif.; H. J. Gibson, Ethyl Corporation, Detroit; R. J. Greenshields, Shell Oil Co., Wood River, Ill.; and G. W. Pusack of the Socony-Vacuum Oil Co., Paulsboro, N. J.

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