Ripe seeds should be soaked in water for one week changing the water daily. Most of them sink to the bottom after this time. They can be sprinkled on the surface of pure sphagnum moss or peat moss and covered with polyethylene or glass until germination begins. The rate of germination depends on how much time has elapsed when seeds were harvested. Fresh seed germinates quite rapidly while older seed seems to germinate after a long wait of several months or more. It is good practice to germinate the seeds in a cool area (below 60 degrees F.). A flowering plant can be obtained from seed in about 4-5 years.

Chrysamphora is reported to have a somatic chromosome number of 30 while the genus Sarracenia has 26. Many attempts to make an intergenerie cross resulted in failure. The other member of this family is Heliamphora whose karyotype is not known. It would be interesting to know its chromosome number because of the evolutionary implications that may result.

A recent newspaper reported that an area around Gasquet, California received a rainfall of 14 inches in 48 hours! This area is rich in Chrysamphora and I am certain that the plants survived the storm and relished the abundance of water that had fallen on them. With the spring reservoirs full, I look forward to a new season of many tall, healthy pitchers swaying in the breeze.

RECENT LITERATURE

Benolken, R. M., Jacobson, B. L.: Response Properties of a Sensory Hair Excised from Venus's Flytrap, J. Gen. Physiol., 56: 64-82, 1970

Multicellular sensory hairs excised from Dionaea leaves were subjected to a destructive dissection technique, disclosing a sensory layer of a radial symmetrical rosette of 20-30 apparently identical cells organized in a plane normal to the long axis of the hair. Intracellular glass electrode probing disclosed a resting membrane potential of about -80 mv. Response to a mechanical stimulus consisted of a graded response and an action potential, the latter similar to that which propagates over the leaf surface. The upper and lower membranes of a single sensory cell are electrically symmetrical in the absence of stimulation, and become asymmetrical with stimulus. Limiting values for the response symmetry were calculated on the hypothesis of an electrical model consistent with the histology of the sensory cells.

Bernob, G.: Paper wasp nest in pitcher plant, Sarracenia purpurea L. Entomol. News Vol 80 (6), p 148 1969

On August 1, 1968, a living pitcher-plant leaf was found to contain an active nest of the common paper wasp. The observation was made at a typical bog habitat near Ashburnham, Mass.

Burgess, L., Rempel, J.: Collection of the pitcherplant mosquito, Wyeomyia smithii from Saskatchewan. Can. Entomol. Vol 103 pp 886-887 1971

Larvae of the above mosquito were collected from pitcher-plants Sarracenia purpurea in swamps near Nipawin, Little Sandy Lake, and Waskesiu. Pupae and adults also were collected at Nipawin.

Fabian-Galan, G., Salageanu, N.: Considerations on the nutrition of certain carnivorous plants (Drosera capensis and Aldrovanda vesiculosa). Rev. Roum. Biol. Ser. Bot. Vol 13 (4) pp 275-280 1968

These two plants were fed radioactively labelled Daphnia. In Drosera, the autoradiographs showed the digested Daphnia were transported in the long run to the rest of the plant. In Aldrovanda, the animal food is transported from the mature traps to the growing point of the plant. The highest radioactivity in Drosera was found in glucose, aspartic and glutamic acids.

Favard, A.: Experimental localization of organs responsible for apical dominance in Drosera intermedia at the time of transition from the vegetative to the inflorescence stage. C. R. Hebd. Seances Acad. Sci. Ser. D Sci. Natur (Paris) Vol 272 (26) pp 3283-3286 1971

Decapitations and leaf bud removals were made at various levels of the terminal bud in the above species. At the time of transition to the inflorescence stage, as in the vegetative stage, apical dominance was partially exerted by the terminal meristem and partially by small leaf buds with a size between 1.7 and 0.4 mm. Apical dominance varied according to plant vigor.

Gibson, M., Warren, K.: Capture of Schistosoma mansoni miracidia and cercariae by carnivorous aquatic vascular plants of the genus Utricularia. Bull. WHO Vol 42 (5) pp 833-835 1970

The author finds an apparent inverse relationship between the presence of the disease schistosomiasis and abundance of Utricularia in the waters of various Caribbean islands. The plants capture the infected miracidia and therefore offer a possible control measure.

Harder, R.: Utricularia as an object for investigations of heterotrophism of flowering plants. Z Pflanzenphysiol. Vol 63 (2) pp 181-184 1970
IN GERMAN

The development of sterile light-grown cultures of Utricularia minor was followed as a function of different combinations of sucrose and acetate in the medium. Optimal growth with sucrose took place with a concentration of 2% and with acetate 0.05%. The highest dry weight was reached with a combination of 2% sucrose and 0.01% acetate in the light. The author advocates using this flowering plant to study processes of carbon chemistry rather than the traditional unicellular algae.

Heslop-Harrison, Y.: Scanning Electron Microscopy of Fresh Leaves of Pinguicula, Science, 167: 172-174, 1970.

Fascinating electron scanning photomicrographs with interpretations are presented, the Pinguicula leaf surface maintaining hydration for at least 4-5 min. after vacuum has been attained. The stalked capturing glands which secrete mucilaginous materials forming into tenacious holding cables as the insect struggles, and the sessile enzyme secreting digestive glands are clearly shown in new perspective and are described. A method for the examination is described.

Heslop-Harrison, Y., Knox, R. B.: A Cytochemical Study of the Leaf-Gland Enzymes of Insectivorous Plants of the Genus Pinguicula, Planta (Berl.), 96: 183-211, 1971.

Enzyme analyses and their secretion from various cell layers of both types of surface glands are discussed. Evidence shows that suitable nitrogenous substanc cause secretion of enzymes and fluids onto the leaf surface within one hour, anc these enzymes are then found depleted from the intracellular sites of sessile glands. Within two hours, digestive products enter the leaf as indicated by

14-C autoradiography and move to the margins. Movement out of the leaf begins in 12 hours. Microautoradiographs showing a concentration of digestion products around the bases of the sessile glands and in the cells of the gland head, indicate absorptive function as well as secretory.

Jacobson, S. L.: Receptor Response in Venus's Flytrap, J. Gen. Physiol, 49: 117-129 1965

It has been reported that the action potentials crossing the surface of the trap of Dionaea always precede trap closure and are propagated by stimulus. Occurrence of non-propagated receptor potentials is reported here, and these always precede action potentials, the former coupling mechanical stimulation phase to the latter in the preying sequence. The tip of the hair was cut off, exposing the medullary tissue and electrode measurements were made directly in the sensory cell region. Evidence is presented that the positive and negative receptor potentials originate from independant sources. Further, the hypothesis that the positive receptor potential is the generator of the action potential is consistent with the data relating mechanical stimuli to the magnitude of receptor potentials, and the latter to the action potential.

Jacobson, S. L.: A Method for Extraction of Extracellular Fluid: Use in Development of a Physiologic Saline for Venus's Flytrap, Can. J. Bot. 49: 121-127 1971

Extracellular fluid was extracted by centrifugation from the tissue of Dionaea. This fluid was subjected to extensive physico-chemical analysis and the results were compared to a similar analysis of exudation sap. These results further were a basis for formulation of a physiological perfusion fluid which was compatible with the plant's tissue. The methods for extraction and analysis are described and the efficacy of the extraction method is discussed.

Judd, W.: Studies of the Byron Bog in southwestern Ontario xxxix Can. Field Natur Vol 83 (3) pp 233-236 1961

The author observed that flies were captured much oftener than other insects on D. intermedia and D. rotundifolia. Insects collected are tabulated, showing 5 orders, 15 plus families, and 19 plus species. Forty-four leaves of D. intermedia and six leaves of D. rotundifolia held a total of 64 insects.

Kondo, K.: Chromosome numbers of carnivorous plants. Bull. Torrey Botanical Club Vol 96 pp 322-328 1969

This paper reports that of the 450 species of carnivorous plants, only 53 species and 5 hybrids have had their chromosome numbers determined. Mr. Kondo has added 7 more new species to this growing list. What makes this report interesting is the fact that all 60 or so species are listed with their chromosome numbers. Drosophyllum lusitanicum and Pinguicula lusitanica have the lowest number of somatic chromosomes-12. On the other hand, D. spathulata can have as much as 80. There are two notable genera whose numbers should be determined and those are Heliamphora and Byblis. Knowledge of the karyotype for both might answer some interesting questions on the evolutionary relationships within their respective families.

Kondo, K.: A new species of Nepenthes from the Philippines. Bull. Torrey Botanical Club Vol 96 pp 653-655 1969

A new species of Nepenthes named N. bellii is morphologically similar to N. gracilis. It is not thought to be a hybrid of N. gracilis due to the doubt attached to any record of this plant being found in the Philippines.

Kondo, K.: Chromosome number of Utricularia resupinata B. D. Greene Journ. Jap. Bot. Vol 46 No. 1 pp 26-29 1971

The chromosome number of U. resupinata was determined to be 2N=18. This same basic chromosome number is also found in many other species (N=9) although polymorphism in this genus is well known. Because Utricularia species can exhibit extreme morphological variations with differences in habitat, observations of chromosome numbers should clarify the natural relationships between species.

Kondo, K.: Chromosome numbers in Drosera and Dionaea in N. Carolina. Journ. Jap. Bot. Vol 45 No. 5 pp 139-144 1970

Five species of Drosera (capillaris, filiformis, intermedia, leucantha, rotundifolia) and Dionaea muscipula were taken from various locations in North Carolina and the chromosome numbers were determined. It was reported that the basic chromosome number of Drosera is 10 (N=10) while in the pollen mother-cells of Dionaea it is 16 (N=16). The karyotypes of both genera are similar which indicates that they are closely related and may remain in the same family.

Kondo, K.: A review of the Drosera spathulata complex. Journ. Jap. Bot. Vol 40 No. 11 pp 321-326 1971

The ancestral race of D. spathulata probably originated in New Zealand (2N=20), and spread outward, into Australia by doubling the number of chromosomes (20 x 2=40). As the distribution proceded northward, the species doubled again (40 x 2=80) and with backcrosses between octaploid and tetraploid plants, the hexaploid plants (40 + 20=60) are now found growing in Japan on Honshu. Here, the species is sympatric with D. rotundifolia (2N=20) and various hybrids between these two species is possible. A pentaploid D. spathulata was found and thought to be a hybrid of D. rotundifolia (N=10) and D. spathulata (N=40). This enabled this plant to migrate into the eastern temperate zone of the Honshu Pacific coast. The hexaploid D. spathulata is found on the western Pacific coast of Honshu.

Kondo, K.: A comparison of variability in Utricularia cornuta and U. juncea. Amer. J. Bot. 59 (1) pp 23-37 1972

Although Utricularia cornuta Michx. and U. juncea Vahl, sympatric in the south-eastern United States, have been considered conspecific by various authors, the present biosystematic approach shows them to be separate species. The taxa are seasonally isolated. While both have the same chromosome number (n=9), strong internal isolation is apparent since artificial hybrids cannot be produced by standard methods. In Utricularia cornuta the mean values of characters studied quantitatively are much higher than those of U. juncea though the extremes of the ranges may overlap. Utricularia juncea has both cleistogamous flowers and chasmogamous flowers while U. cornuta has only chasmogamous flowers. The flowers are self-fertile and apparently are usually, if not always, self-pollinated, even though they are highly adapted to specialized insect pollinators.

Kondo, K.: Germination and developmental morphology of seeds in U. cornuta and U. juncea. Rhodora Vol 73 pp 541-547 1971

Since these two species are so closely related, the author examined the possibility of distinguishing the two species by differences in morphology of the seedlings. Seeds germinate with high percentages on Moore's solution under sterile culture. Indeed, it was found that the two species differ as seedlings morphologically. U. juncea usually has one chlorophylose cotyledon and a second cotyledon that is capable of developing into rhizome and bladders. The angle between these structures determines the differences between the two species when grown on the above medium.

Krajina, V. J.: Sarraceniaceae, a new family for British Columbia.
Syesis Vol 1 pp 121-124 1968
Many large plants (number not stated) of S. purpurea were found in a peat bog about 20 miles south of Fort Nelson, B. C., near Jackfish Creek. The Alaskan highway 97 is found nearby. This station extends the range of this species so that it has now the largest distribution of all the pitcher plants. However, this locality is still east of the Rocky Mountains and belongs to the Boreal white and black spruce biogeoclimatic zone.

Lebrun, J.: New localities and chorology of vascular plants of Africa.
Bull. Soc. Bot. Fr. Vol 166 pp 367-375 1970
A new locality is given for a rare carnivorous plant from tropical Africa, Aldrovanda vesiculosa.

Mackie, G.: Neuroid conduction and evolution of conducting tissues.
Quart. Rev. Biol. Vol 45 (4) pp 319-332 1970
Neuroid conduction refers to the propagation of electrical events in non-nervous cells. Dionaea and Mimosa are two genera that provide examples of neuroid conduction. The former plant possesses trigger cells which function in an analogous way to certain animal receptors. Transmission from cell to cell is thought to be electrical via low-resistance pathways. The author discusses the evolution of these excitable cells in various plants and animals.

McDaniel, Sidney: The genus Sarracenia (Sarraceniaceae).
Bull. Tall Timbers Research Sta. No. 9 September 1971
This report deals with the morphological, ecological and taxinomical treatment of the genus Sarracenia. Excellent drawings of each species vegetative and floral structures accompany this work. They are noted for their accuracy and attention to detail. Interestingly, the significant statement that the author makes is in denying the existence of S. jonesii as a distinct species or subspecies. Instead, it is recognized in this report as a severe morphological diverse species under S. rubra.

Mozingo, H., Klein, P., Zeevi, Y., Lewis, E.: Venus's flytrap observations by scanning electron microscopy. Amer. J. Bot. Vol 57 (5) pp 593-598 1970
Observations of the digestive glands, trigger hairs, epidermal surface, nectar glands, touch receptors, and stomata of Dionaea were carried out by means of electron microscopy. Previously undescribed details of the surface topography were resolved which may correlate with certain functions of the plant.

Pinner, E.: Unusual caterpillar grows on the carnivorous Dorsera capillaris.
Naturwiss Rundsch Vol 20 (11) 479 1967
A caterpillar was found on the leaves of the above species eating the sticky plant material on the tentacles and pupates there. The species was Trichoptilis parvulus.

Raju, M. V. S.: Development of floral organs in sites of leaf primordia in Pinguicula vulgaris. Amer. J. Bot. Vol 56 (5) pp 507-514 1969
Plants of this species have either clockwise or counterclockwise spiral phylotaxy. The inception of floral primordia occurs in leaf sites as a normal sequence of development. The apical meristem continues to produce leaves in the vegetative phase and flowers in the reproductive phase, and thus the plants show a monopodial growth. In a long-lived plant one or the other genetic spiral is

maintained in spite of the interruption caused by the appearance of flowers in leaf sites.

Rao, T. A., Shanware, P. G., Tribedi, G. N.: A note on the pitcher plant habitat in Assam. The Indian Forester Vol 95 (9) pp 611-613 1969
This report describes the ecological features of N. khasiana as it grows on the Khasi hills in India. Soil samples were analyzed for many physical-chemical characteristics such as pH which was about 5.3 in the sandy soil. The most vigorous growing plants were related to the amount of moisture they receive than to any other measured parameter.

Rothfels, K., Heimburger, M.: Chromosome size and DNA values in sundews (Droseraceae). Chromosoma Vol 25 (1) pp 96-103 1968
Relative DNA content has been determined for root tip nuclei of Drosophyllum (2n=12), D. rotundifolia (2x=20), D. intermedia (2x=20), D. linearis (2x=20), D. binata (3x=32), D. capensis (4x=40), D. spathulata (8x=80). The relative DNA values per diploid genome for Drosophyllum and diploid, triploid, and higher polypoid Drosera were approximately as 16:4:2:1. These values are terms of a geometric series and are compatible with a multistranded (polyneme) interpretation of chromosome structure.

Scala, J., Iott K., Schwab, D., Semersky, F.: Digestive secretion of Dionaea muscipula. Plant Physiol. Vol 44 (3) pp 367-371 1969
In about a 7-10 day digestive cycle in Dionaea, the author found that maximum secretion of enzyme occurs within the first three days. Phosphatase, proteinase, nuclease and amylase have been observed in the secretion.

Schmid, R.: Nepenthes studies: Homologies of the operculum, lid, and apex (calear, spur). Bot. Jahrb Vol 90 (3) pp 275-296 1970
IN GERMAN
By examining carefully the formation of the Nepenthes pitcher lid and spur, the author observed that the two-lobed lid appears before the spur or apex. According to many other authors, the spur is considered to be the true apex of the leaf and the lid, the apical part of the lamina. These observations are correlated with the evolution of species in the genus.

Schwab, D. W., Simmons, E. and Scala, J.: Fine structure changes during function of the digestive gland of Venus's flytrap (Dionaea muscipula). Amer. J. Bot. Vol 56 (1) pp 98-100 1969
Changes in the structure of the digestive glands cells of Dionaea during the digestive process have been studied with light and electron microscopy. Essentially, the various organelles such as mitochondria show physical enlargement which is indicative of an elevated biochemical activity. Changes also take place in the cell wall and membrane which are associated with secretion of the digestive fluid. The author discusses these and other complex changes during the 7-10 day digestive cycle.

Sievers, A.: The outer epidermal wall of the sensitive hairs of Dionaea muscipula. Planta Vol 83 (1) pp 49-52 1968
IN GERMAN
The author found under the electron microscope the presence of numerous radially arranged fibrils in the cuticular layer of the sensitive hair. These fibrils possibly make the sensitive hair elastic and enable it to undergo repeated bendings.

Sorenson, D.: The utilization of paramecia by the carnivorous plant Utricularia gibba. Planta Vol 82 pp 166-170 1968

U. gibba. bladders capture large numbers of paramecia within a short period of time under controlled conditions. This results in an increase in the number of bladders and permits a direct evaluation of the role of entrapped animals in the nutrition of this plant.

Subramanyam, K.: Studies on the traps of some Indian species of Utricularia. Bull. Bot. Surv. India Vol 9 pp 201-205 1967

The morphology of the traps of the following native carnivorous plants were studied: U. baouleensis, bifida, graminifolia, kumaonensis, scandens, and squamosa.

Swales, D.: S. purpurea as host and carnivore at Lac Carre, Quebec. Natur. Can. Vol 96 (5) pp 759 - 763 1969

In the fluid of pitchers, spiders and insects of 21 families were found partially digested, while mites and dipterous larvae of 3 genera were living unharmed by the enzymes secreted by the plant. A tentative explanation for difference in reaction of the two groups is put forward.

Williams, M., Mozingo, H.: The fine structure of the trigger hair in Venus's flytrap. Amer. J. Bot. Vol 58 (6) pp 532-539 1971

The trigger hairs of Dionaea were examined under the electron microscope. The author points out the various complicated number of organelles within the three regions of the trigger hair which differ in size, shape and cytoplasmic content. The possible functional significance of these structures is discussed.

A BOOK REVIEW

Erickson, Rica: PLANTS OF PREY Lamb Publications Pty, LTD. 94 pages Pub. 1968

This little book provides a comprehensive survey of the carnivorous plants growing in Australia. The writer gives a fund of information about these fascinating plants in a simple style that will be of great value to both the general reader as well as the botanist. She describes in detail the various species which are accompanied by excellent colored plates, black and white sketches and information about the localities where they may be found. A possibly controversial section of the book "lumps" the previously accepted eight species of Australian Nepenthes into one, and reasons for so doing are offered.