

ing from the base of the mid-rib, through the overgrown or enlarged portion, to the extreme margin. This vein, later on in the series, forms the mid-rib of the added leaflet. The variation in the blackberry leaves emphasizes this interpretation. The trifoliate leaves seem to be struggling towards the higher type represented by the five leaflets. This is seen so plainly and so commonly that it is the exception when a blackberry bush is found whose leaves do not illustrate various transition stages of division.

Potentilla Canadensis, common cinque-foil or five-finger, furnishes an extremely interesting illustration of various transition forms. It is an embryonic history of evolution in itself, which any one may read who observes it closely.

Examples might be multiplied *ad libitum*, for plants everywhere, both in cultivation and wild, repeat the same story over and over again.

The mode of division in pinnate leaves differs from that just described in palmate leaves. In all pinnate leaves which have been observed, with one exception, the newly formed leaflets were given off from the terminal leaflet. The latter will often be found unsymmetrical or lopsided, occasioned by the extra fullness produced by this evolutionary tendency towards division. The vein which is destined to become the mid rib of the future leaflet becomes prominent, and the outline of the unborn leaflet, as it were, may be plainly seen ere the division has proceeded beyond a slight notch.

After a new leaflet has been given off, there seems to have been a portion of the parent leaflet cut away; and if the new leaflet be held close against this curved or cut portion, it will be found that it corresponds with the outline of the new leaflet. The opposite side of the parent leaflet will now be found to be the larger, and the burden of adding the next leaflet lies with it: after a leaflet has been given off from each side the terminal leaflet may again become symmetrical until a repetition of the process first described again takes place. *Tecoma radicans*, *Sambucus Canadensis*, *Ailanthus*, are familiar examples of this plan of division.

The development of bi-pinnate and tri-pinnate from the simple pinnate leaves was also observed frequently; especially was this noted in the leaves of *Sambucus Canadensis*. In this case the new leaflets are given off from the oldest leaflet, or that nearest the base, first on one side, then on the other, preserving the symmetry with such precision that one is awed by the beauty and harmony resulting from the workings of vegetative forces.

As stated above, there proved to be one exception to the general plan of division among pinnate leaves. This exception was found in the leaves of the rose. Search for transition stages was made again and again in vain, when one day, while examining the leaves, more from force of habit than with the hope of finding anything bearing on the subject of variation, the mystery was cleared away.

At the base of the rose leaf two adnate stipules are found, and these stipules themselves may be called the little mother-leaves, for the leaflets of the rose appear to have been developed from the stipules. Specimens were found where the "promise and potency" of the future leaf yet existed in the stipules, awaiting, as it were, the magic touch of evolution. The upper part of the stipule becomes enlarged and leaflike, taking on more and more the shape and size of the normal leaflet, until a perfect one is formed. A graduated and progressive series was frequently found, showing various stages of transition, from the stipules alone to the mature leaf, consisting of seven or more leaflets. The new leaflets may be

readily discerned before they are given off or separated from the stipules.

The petiole lengthens as the leaflets are added, thus making room for the newcomers. If a rose-leaf is examined, the leaflets near the base will sometimes be found to be more or less alternate, but becoming opposite in the direction of the apex. This may be explained by the manner in which the leaflets are developed, viz., alternately.

The tendency in leaves to divide is manifested by many simple leaves. Very often on plants bearing lobed leaves, deeply lobed or cleft ones are found; and again, on those plants where entire leaves obtain, more or less notched or lobed ones often occur.

An increased leaf-surface implies a larger amount of elaborated plant food, and consequently an increased product, either in rapidity of growth, beauty of bloom, quantity or quality of fruit. Spencer says, "Every change of form implies change of structure; and with change of form and structure comes change of function or quality." The same laws of development are seen in the study of leaves as in the social world. Heredity gives the direction in the bud or germ, and the conditions or education unfolds it. If the season is favorable, the leaf takes a pre-impressed direction of growth, and surpasses its neighbors in assuming new forms, and the average is passed; while unfavorable conditions may produce a degradation, or appeal only to the lower states of development. It will be understood, therefore, that I do not mean to convey the idea that leaves undergo this evolutionary division during a single season. On the contrary, the principles of "natural selection" and "the survival of the fittest" have left their impress upon the animal and vegetable kingdom alike. Slowly but surely heredity transmits the gain through good conditions to succeeding generations. Through the long ages of the past this process has been going on; each generation has passed on the improvements it received from its ancestry, and has added its own gain for the advance of its posterity. Each generation comes forth with renewed powers to unfold in some special direction, and I have endeavored to show, in a few cases, the plan followed in the evolution of leaves.

MRS. W. A. KELLERMAN.

NOTES AND NEWS.

THE ninth congress of the American Ornithologists' Union will convene in New York City on Tuesday, Nov. 17, 1891, at 11 A.M. The meetings will be held at the American Museum of Natural History, Central Park (77th Street and 8th Avenue). The presentation of ornithological papers will form a prominent feature of the meetings, and members are earnestly requested to contribute, and to notify the secretary in advance as to the titles of their communications, so that a programme for each day may be prepared.

— Mr. Michael E. Sadler, the secretary of the Oxford University Extension, has accepted the invitation of the American Society for the Extension of University Teaching to lecture under its auspices in December and January of the coming winter.

— Mr. Halford J. Mackinder, reader in geography to the University of Oxford, and staff lecturer to the Oxford University Extension, comes to Philadelphia next March to lecture under the auspices of the American Society for the Extension of University Teaching, 1602 Chestnut Street, Philadelphia.

— The American Society for the Extension of University Teaching proposes to hold, during the holidays, a conference of the leading college men of the country, to consider the subject of university extension from a college point of view. This confer-

ence ought to result in broader views of the relation of the university to university extension.

— University extension has attracted much attention in France. The ministry of education has appointed a committee to investigate the workings of the movement in England, and delegates of the French government were present at the Oxford summer meeting.

— Rev. W. Hudson Shaw, M.A., one of the most popular of the Oxford university extension lecturers, has been engaged by the American Society for the extension of University Teaching for the entire winter of 1892-3.

— The effort of the American Society for the Extension of University Teaching to establish the system of graded work in the Philadelphia centres is meeting with strong success. The West Philadelphia centre has agreed to follow courses of twenty-four weeks each, in literature, history, and science. Wagner Institute plans two such courses in literature and American history. In urging this graded work upon the centres, the popular idea is not lost sight of, but is united with that of consecutive, well-graded study.

— The University of Wisconsin offers for the coming winter university extension lectures on "The Colonization of North America," by Professor Turner; "English Literature," by Professor Freeman; "Scandinavian Literature," by Professor Olsen; "Antiquities of India and Iran," by Dr. Tolman; "Bacteriology," by Professor Birge; "The Physiology of Plants," by Professor Barnes; "Electricity," by Dr. Loomis; and "Geology," by Professor Salisbury. Courses in other departments will be given if any desire for them is expressed. According to the regulations adopted by the board of regents, courses can be given only where the lecturers can go and return without interfering with their class-room duties; but if the success of the proposed courses warrants it, lecturers who can give their entire time to the work will probably be provided.

— Cincinnati has begun the work of university extension with great enthusiasm and zeal. Classes in history, chemistry, and Latin have already begun. Biology, analytics, and trigonometry are proposed for a later course.

— Rhode Island is a conservative state, but when it makes up its mind to change, it enters upon the proposed work with earnestness and vigor. Brown University has already successfully inaugurated university extension in the State. The promptness with which the various towns follow its lead is only a new example of the power which the universities possess for developing and moulding the educational interests of the State. Mount Pleasant, one of the suburbs of Providence, has just formed a new extension centre, with lectures on English history, by President Andrews of Brown University. Professor Wilfred H. Munro, director of university extension for Brown University, has been invited to explain the movement and help in the organization of a centre at Newport. The teachers of Providence are also interested, and plans for several classes under university professors are being discussed.

— The Trenton, N.J., university extension centre offers four courses of six lectures each, in place of the single course given last year. This indicates strong and healthy growth. The first course will be from Oct. 16 to Nov. 10, upon "The Plays of Shakespeare," by Dr. Murray, dean of Princeton College; the second, "Historical Geology," from Nov. 17 to Dec. 22, by Professor W. B. Scott of Princeton; the third, "Political Economy," from Jan. 12 to Feb. 16, by Professor Robert Ellis Thompson of the University of Pennsylvania; and the fourth, illustrated lectures on "Light and Color," from Feb. 23 to March 29, by Professor Goodspeed of the University of Pennsylvania. Besides furnishing these twenty-four lectures for three dollars, the Trenton centre offers a supplementary course without charge, if, as is quite probable, the funds received warrant it.

— Topeka, Kan., is to have a university extension course of twelve lectures on electricity, by Professor Blake of the University of Kansas.

— Kansas City has organized a society of university extension, with Hon. Edward H. Allen, president; Professor John T. Buchannan, vice-president; J. F. Downing, treasurer; and John Sullivan, secretary. At the meeting when the organization was effected, short addresses were made by Professor Blackmar of Kansas University, and by Dr. S. S. Lows of Kansas City, ex-president of Missouri University. Professor Blackmar stated that Kansas University would offer eighteen different courses to the people of Kansas City.

— Among the encouraging signs of the times we observe that the colleges open with full classes, and, usually, large accessions. Harvard, Yale, and the Massachusetts Institute of Technology, in New England, the University of Michigan, and all the State universities of the West, as well as Columbia, Princeton, and Lehigh, nearer our own doors, all report crowded classes. Our own State university — Cornell — is just heard from, the accounts of the registration having only just been made up, owing to the rush of business in the registrar's office. The *Ithaca Journal* gives us the following for Oct. 15: freshmen, 431; sophomores, 327; juniors, 221; seniors, 186; graduate students, 126; total, 1,491. The *Journal* of the 17th states that accessions for the week carry the total above 1,500; while the increase for the year, dating back to Oct. 15, 1890, is about 225, or 15 per cent. The increase, curiously enough, is mainly in the two extremes, arts and engineering; the other courses remaining about stationary. Candidates for B. A. number 140, for C. E. and M. E. about 650. The university is about equally divided between the literary, the so-called liberal, departments and courses, and the scientific and engineering. Sibley College enrolls just one-third of the students in the university, having 481 undergraduates, of whom 193 are regular freshmen; while its proportion of the graduate students and its "specials," of whom we are told there are usually about a dozen, makes its enrolment somewhere about 525 in all. The number of graduates, principally coming from other colleges, has trebled in the year. The university is greatly embarrassed, notwithstanding its great endowment, by the continual demands for new buildings, which must be paid for out of the income.

— In a recent number of *Petermann's Mittheilungen* Dr. F. Krümmel states the results of his investigations of the Sargasso Sea, a summary of which is given in the Proceedings of the Royal Geographical Society for October. He differs entirely from Humboldt as to the shape of the floating mass of vegetation. The "great bank of Flores and Corvo" is, he says, Humboldt's summing up of the observations made by sailing-vessels passing through the Sargasso Sea on their way from the southern hemisphere to Europe. These followed with slight variations the same course, and their observations were naturally limited in extent. It was on these insufficient data that Humboldt founded his theories as to the size and shape of the Sargasso Sea, but now, by the aid of steam, we are able to arrive at more correct conclusions on these points. On a map which he has prepared, Dr. Krümmel has plotted out the general contour of the mass of floating vegetation, and has indicated in what parts of the sea the sargasso is found in the greatest abundance. In shape the Sargasso Sea is a sort of ellipse, the great axis of which almost coincides with the Tropic of Cancer, while the two foci are near longitude 45° and 70° west. Around this central ellipse others are indicated, larger in size, but with the vegetation much less dense. In their general outlines they follow with sufficient nearness the course of the prevailing winds. As to the origin of the algæ, Dr. Krümmel is strongly of the opinion that they come from the land — not only from the Gulf of Mexico and the coast of Florida, but from the shores of the Antilles and the Bahamas. The most recent studies with regard to the origin and course of the Gulf Stream tend, he thinks, strongly to support those who assert that the algæ come from the land, and to disprove the contention of those who support the hypothesis of a marine origin. Now that it is settled that the Gulf Stream is not a single narrow stream issuing from the Gulf of Mexico, but an accumulation of converging currents sweeping past the coasts of the Antilles and through the adjoining seas, it is obvious that the quantity of algæ carried away must be much greater than it could have been were the old hypotheses of

the origin of the Gulf Stream correct. Dr. Krümmel makes an approximate calculation as to the time occupied by the algæ in reaching the Sargasso Sea. A fortnight after reaching the Gulf proper, the weed would, at the rate of two knots an hour, reach the latitude of Cape Hatteras. From that point its onward motion is slower, and it takes about five months and a half for it to reach west of the Azores. After reaching the Sargasso Sea the weed continues to move slowly, until, becoming heavier as it grows older, it gradually sinks to make way for fresh supplies.

— There will be an examination at the Civil Service Commission on Nov. 3 to secure two computers for the Nautical Almanac Office. The salary of one will be \$1,000 and the salary of the other will be from \$1,000 to \$1,400, to be determined after examination. The subjects will be algebra, geometry, trigonometry, logarithms, and astronomy. Application blanks can be obtained of the commission. District applicants will not be admitted. Arrangements may possibly be made for examining applicants at prominent cities outside of Washington if applications are filed in time.

— Mr. J. C. Russell, who has been engaged in exploring the Mount St. Elias region of Alaska, has been heard from at Yakutat. He was not successful in reaching the top of the mountain, but he attained a greater elevation than the height of the mountain as reported by him last year, between 14,000 and 15,000 feet, and there were still some four thousand feet to climb to reach the summit. This places the height of the peak between 18,000 and 19,000 feet, and restores St. Elias to its former position of one of the highest mountains on the continent. La Perouse, in 1876, placed its elevation at 12,672 feet, and it has varied from this all the way to 19,500 feet, as given by Dall in 1874.

— The long talked-of expedition from Australia to the south polar lands has now assumed the title of a "Swedish-Australasian Expedition," and is likely soon to be equipped and dispatched. At a meeting held in Melbourne on the 3d of July last, according to the October Proceedings of the Royal Geographical Society, the report of the Antarctic Exploration Committee was read, in which it was stated that a grant of £1,000 had been proposed by the Queensland government, another of £1,366 on condition that the public subscribed £634, by the New South Wales government, and a third of £300 by the government of Tasmania. It remained to be seen what sum the ministry of Victoria would place upon the estimates. Added to the Swedish donation of £5,000, and a similar sum from Sir Thomas Elder, there remained a balance of £2,000 only to be subscribed and insure the success of the expedition, for the successful carrying out of which Baron Nordenskiöld had stated that £15,000 would be sufficient. At the recent International Congress at Berne a resolution of approval of the proposed expedition and hearty wishes for its success was passed on the reading of a paper on the subject by Admiral Sir Erasmus Ommanney. As a pioneer expedition the project is likely to accomplish most useful work, and its promotion, in face of many obstacles, is highly honorable to the public spirit of the Australian colonies.

— I once heard of a boy who had a pet seal given to him when it was quite young, says a writer in the *Illustrated American*. It became very tame, and used to cuddle up beside the dogs to sleep in front of the fire, and learned to perform very many tricks. One winter the storms were very severe, and the fishermen were at times quite unable to venture to sea to set their nets. As a matter of course fish were scarce, and the seal's food having been of fish alone, milk had to be substituted; but it consumed such vast quantities of the latter that, for purposes of economy, after a family council, it was decided to dispose of the beloved pet as soon as possible. The boy and a clergyman friend, who had always taken a lively interest in the pet, started off in a boat with their precious victim, and, when far enough out for safety, threw the seal into the water. Little did they expect the result, for the creature, feeling itself very much abused, rushed after the boat with all its might and main, uttering such tearful and heart-rending cries of grief that it was at last taken back into the boat, where it lay exhausted, sobbing and wailing like a child. When

the familiar home was reached it soon regained its former gaiety and health, and lived to a good old age, little the worse for its adventure.

According to *Nature*, Mr. W. H. Harris of Ealing, England, records in *Nature Notes* (Sept. 15) a remarkable instance of "frugality" in bees. The recent extremely rainy weather seems to have suggested to his bees that there would probably soon be an end of honey-making. Accordingly, although there was "a crate of fairly filled sections above the stock-box," they adopted vigorous measures to prevent future inconvenience. "It is a positive fact," says Mr. Harris, "that my bees, not content with ejecting larvæ of both drones and workers, proceeded to suck out the soft contents of the corpses, leaving only the white chitinous covering, which had not hardened sufficiently to prevent the workers from piercing it with their mandibles, and then inserting their tongues."

— Mr. W. Prentiss of Rainham, England, describes in the October number of the *Zoologist* an interesting case of a wild duck's forethought. As quoted in *Nature*, a mowing machine was set to work round the outside of a field of lucerne bordering a marsh, diminishing the circle each time round the field, leaving about two acres in the centre. A wild duck was seen by the shepherd to fly from the piece of lucerne that was left with something in her beak, and, happening to fly near him, she dropped a three-parts incubated egg. She was again observed by the shepherd, and also by the sheep-shearer, carrying another egg in her beak, this time over the marsh-wall towards the saltings; and again she was seen for the third time carrying an egg in her beak in the same direction. Next day, when the field was finished by the removal of the last piece of lucerne, the wild duck's nest from which the eggs had been removed was discovered.

— Carl Lumholtz (author of "Among Cannibals"), who is the head of the expedition now making explorations in the Sierra Madre of Mexico, under the auspices of the American Geographical Society and the Museum of Natural History of New York, will write exclusively for *Scribner's Magazine* the results of his investigations and adventures. The first paper will appear in the November issue. Dr. Lumholtz says: "My intention is to investigate accurately the language, habits, and customs of the primitive people of the Sierra Madre by living with them, as I did with the natives of Australia; and thus I may hope to do my share in the noble work of elucidating the history of the native race of this great continent."

— The Imperial Academy of Sciences, Vienna, has just published in its *Memoirs* (Vol. XXXIX., Part First) a posthumous work of the traveller Dr. J. J. von Tschudi, which is of uncommon interest to ethnographers and linguists. Its title is "Culturhistorische und sprachliche Beiträge zur Kenntniss des alten Perú" (Wien, F. Tempsky, 1881, pp. 220. 4^o). The contents are arranged under thirty eight headings having Indian names, and to give an idea of these, some of those more generally known may be mentioned here: Amaúta, Apatchita, Ketchua, Korikantsa, Llama, Papa, Pariana, Patchakamak, Sairi, Tawantin-suyu, Waka, Waskar (usually spelled *huaca*, *huaskar*), Wirakotcha. In the article "Ketchua" he gives his reasons for defending Clements Markham's opinion, that there had never been an Aimará people, but that the language called Aimará was really that of the Kola'o, or, as we will call them now, Collas. This people was of a sturdy, ferocious race of mountaineers, which resisted for many years the attempts at subjugation made by the Inca "kings." When they had been conquered, the kings colonized other provinces with Kola'o men, who were forced to emigrate, and placed colonists in the Kola'o country, who were taken from Ketchua-speaking populations of the province Aimará. Thus a mixed people was formed, and a new medley language originated among it, which we know under the name of Aimará. In this medley language the elements of the Kola'o are still recognizable from those of the intrusive Ketchua, and prove to be of another linguistic family. Markham's idea of its origin has been also upheld and further developed by Tschudi in his excellent book "Organismus der Ketchua-Sprache" (1884).