

ZOE

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SAN FRANCISCO, CAL.

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CUSTOMS OF THE COYOTERO APACHES.

BY EDWARD PALMER.

The following notes were made during a recent botanizing trip to Fort Apache. The writer gratefully acknowledges his obligations to Capt. W. C. Shannon, to Dr. Warrick, to Dr. Thompson and to Mr. C. E. Cooley, for hospitality, and for every possible assistance in furthering his aims:

This tribe of Indians have their home in the White Mountains of Arizona, at a sub-agency called Fort Apache, situated in a high mountain valley, about a hundred miles south of Holbrook, a station on the Atlantic and Pacific Railroad. Some years ago they were removed, against their will, to the San Carlos Reservation, but protested against this action, as they not only preferred their native haunts in the White Mountains, but were on unfriendly terms with other tribes on the reservation. They finally obtained permission to return to their former home, agreeing to support themselves without assistance from the government, and Fort Apache was thereupon built and garrisoned for their protection. The Indians have not disappointed their friends, and having turned their attention to farming, they produce sufficient for their needs in all ordinary seasons. The barley and wheat they grow is principally cut for hay, for which also they cut the native grasses. For this, as well as the corn and other products raised by them, the post affords a ready market; and to encourage their husbandry, the government has lately provided them with a hundred and fifty wagons and enough harness to allow two single sets to each wagon. On the arrival of these at Holbrook a sufficient number of Indians were on hand with their ponies, and, unused as they were to such tasks, neither Americans nor Mexicans could with the same unbroken animals have better managed the train on its way to Apache.

A certain number of the men are employed as scouts, regularly

enlisted for a period of six months, in two companies—one mounted; the other employed in various ways about the camp. A soldier is detailed to do the cooking and another to look after the rations, or in their improvident generosity to relatives and friends, the latter half of any given time would be a period of famine.

These scouts have often the same desire for a wider and more adventurous life that animates the boy brought up on a course of dime novels. One of them who rejoices in the name of Riley, in answer to a question, said, "Fort Apache is dull. I want to go to Holbrook and be cow-puncher (cow-boy); then I can go to the bar, like other men, and say, 'Boys, come up and take a drink.'"

The land is apportioned by the chiefs among the women, who divide it among their female children. In former times no male Indian would disgrace himself by working, and their rude agricultural operations were all conducted by women. The men now work, however, and use the hoes and plows furnished them by the government.

Their language is similar to that of the Navajos, the difference being like that between pure English and its dialects. Formerly they were enemies, but now being on reservations and not allowed to go to war, they have a peaceful trading intercourse. The Apaches having money, derived from the sale of hay, corn, and from their service as scouts, the Navajos bring to them in exchange blankets and horses. The trading is conducted with fairness and decorum.

Private quarrels are usually settled by arbitration of friends, and payment is exacted by the injured. In one of their disputes a son of one of the parties was killed, and to appease the wrath of the parents the friends of the homicide gave a girl eight years old to replace the boy. The injured father took care of her for some time, and then made her his second wife.

They appear to have hardly any religion. A crude Christianity derived from intercourse with the Mexicans and the former efforts of priests appears to have partially replaced whatever of earlier faith they may have owned. "Tchin" is the name applied to an evil spirit, or to that unseen something they fear. They suppose that the dead are about in the darkness, and as they do not wish to meet them, they keep in at night as much as possible, and women going from one dwelling to another will carry a firebrand. This fear of the darkness helped the soldiers formerly in their night attacks, but

since the enlistment of the Indians as scouts, they are losing a little of this timidity.

Marriage is, as usual among savages, by purchase of the wife. If the prospective husband is not possessed of the amount demanded, his friends often assist him to raise the required sum; even the whites have been sometimes appealed to for help. During courtship the mother is a prominent figure, but after the marriage is concluded she is completely tabooed by the son-in-law. He never speaks to her nor enters her house, and she will neither intrude nor even look upon him, though she may look after his children or send him food or other assistance. A ludicrous example of this prejudice was given a short time ago. Last Christmas the officers of the scouts gave them a dinner, inviting also their families, but as the men were unable to appear where their mothers-in-law were, the guests were principally women and children. Both sexes look after aged mothers, but neither for mothers-in-law.

Female chastity is highly regarded, and a man finding his wife not to be a virgin, may discard her and demand back her purchase price. Adultery was formerly punished by cutting off the nose, the relatives of the husband performing the operation. This is now seldom done, the woman being simply chastised and discarded. Unmarried girls have their hair bound in the back by an oblong piece of leather, bound with some bright color and studded with brass buttons. It is a very showy and glittering ornament, covering as it does the greater part of the back of the head, but it is discarded at marriage and the hair worn free. For hair brushes the roots of yuccas and of a coarse species of grass are used. They are made by doubling a bunch in the middle, and tying, the ends meeting and of the same length. As a brush it is rather coarse, but so is their long thick hair. The hair is cut by putting under it a bow or suitable piece of wood, then with a sharp knife cutting it square off. This is the way with nearly all the Indians of the United States. The exceptions are those under missionary influence, who have their hair cut short all over, as a sign of Christianity, and a few tribes who roach it.

Polygamy is practiced, and the wives are often of different ages, sometimes no more than eight years old. Sometimes they are all sisters. There are no favorites, and in their frequent quarrels the man takes no part. Should one leave him, as sometimes happens,

she takes her children. They usually, however, after a short time reconcile their parents. Children are treated kindly and very seldom punished, and orphans are often even better treated than their own children. Malformed children are rare and are not killed, but twins usually are, one or both. It is considered disgraceful and beastlike to have twins, and some of the Indians even believe that they necessarily have different fathers. Deaths in childbirth are very rare, maternity among them being apparently a much simpler matter than among civilized nations. On the march or away from their dwellings a woman steps aside, others form a circle about her, and in a short time she reappears with her pappoose. In their village a secluded hut is used for the purpose, and if the woman have a female assistant she is paid for her services.

The tribe seems to be increasing in numbers, females apparently predominating. They treat the sick kindly. Medicine men attend the sick in masks and attempt their cure by incantations. There is no penalty if the patient dies. Sweat-houses are in use, and a few plants are chewed and the juice blown from the mouth or rubbed upon the seat of pain. The soap plant (*Yucca angustifolia*) is used as an emulsion in cases of insect and snake bites. An attempt by medicine men to cure cross eyes in a child was witnessed. They covered the child's head with a net made of the leaves of a species of yucca and the arms were encircled with bands of the same. Their frantic evolutions, with voice and drum accompaniment, then began and the eyes of the child rolled wildly with fright. After hours of their noisy, exciting gyrations, during which band after band was removed from the child's arms, the eyes were found to be unchanged. They apparently have a strong prejudice against civilized remedies for the cure of ailments and for surgical appliances to wounds. Contact with civilization, however, is slowly altering this. An Indian who was thrown from his horse and had his shoulder dislocated was induced to go to the hospital for treatment. He took a companion with him to witness operations, but ether being administered in preparation for replacement, the friend could not endure the sight of the senseless body and hastily left, saying he would return. He did so when the shoulder was replaced, and the patient was recovering from the effect of the ether. On being questioned the sufferer described his feelings as being drunk, going to sleep, waking up and finding his arm all right. He was cheerful

and made his statement in a pleasant manner, saying, "I am for white man's medicine now."

Their rainy season is in July, August and September. When it is delayed, or there is unusual need, they try to produce rain by making many fires in dead trees about in the woods. Possibly the resemblance of the smoke to clouds has led to the practice.

This band of Apaches bury their dead, burn the dwelling and everything belonging to them, and kill their animals, making no use of the carcasses. Mr. Cooley, who has long been their neighbor and has much influence over them, informed me that a Mexican prisoner who had lived among them and married one of their women, died after accumulating a large number of cattle, leaving his son to Mr. Cooley's guardianship, but before he could interfere and take possession of his ward's property, forty head of fine fat animals had been already killed and left to decay. The name of the dead must not even be mentioned. There are some, however, among them who will listen to advice and refrain from destroying their property, especially their live stock, as they see and feel the advantage of its increase to their children. Women act as undertakers, wrap the dead body in blankets, and, if traveling, pile rocks over the remains; but, if stationary, they take it to some ravine or out of the way place, and hide it with rocks or other material, or conceal it in a cave, if one be within reach. The men will not touch the dead, nor even anything defiled with human blood. Mourning is considered as befitting the women only. They are expected to show grief at burials and on sorrowful occasions. The men cannot, however, face the suffering of their friends unmoved. One Sunday at Fort Apache two women fought furiously, cutting each other considerably. When the battle was ended the surgeon sewed up their wounds, and their cries of agony caused their male friends to weep freely—no ceremonial weeping for effect, but real sorrow for the pain endured.

The Coyotero musical instruments consist of a fife made from elder wood, a corn-stalk fiddle, and a drum made by stretching wet buckskin over an earthen pot or camp kettle. Their music, though rude and monotonous, is not unpleasing. Their bows are made of ash. They have few spears, and their war clubs are made by removing the bone from the large end of a cow's tail, filling its place with a round stone, over which the skin is firmly sewed. The an-

cient dress has almost passed away, and their clothing is now nearly that of Mexicans of the lower class. They still, however, wear leggings which resemble those of the Navajos, curious moccasins which have a long turned-up piece at the toes pierced with holes to admit the air, and the breech-clout, which they seem unwilling to lay aside, even though wearing trowsers.

These Indians do not tattoo or put upon themselves any tribal marks by which they might be distinguished from other Apache bands. Painting the person is a matter of individual fancy, and entirely without significance. They may be often seen ornamented in various colors—spotted, striped, or marked with large blotches. Their so-called war paint is, like the rest of their finery, put on principally to render them objects of more admiration to their women. Their paints are usually mineral. Red and yellow are obtained by mixing colored clays in water; white is calcined gypsum. The dark color of mourning is plumbago, but sometimes for personal decoration they burn some of the roasted agave, which mixed with water gives a fine black.

There seems to be a tendency on the part of most persons who write about Indians to find some significance, mystic or historical, in their most trivial acts. Many of them are aware of this state of the investigator's mind, and, from the desire to render themselves more interesting, as well as a childish mischievousness, "stuff" him with a large amount of nonsense. In the case of the Coyoteros, at least, it is certain that their ornamentation of objects is only a fancy occupying them at the time. They use no patterns even, though they probably, even if unconsciously, imitate.

The Coyoteros are apparently more honest than any other Apaches, Navajos or New Mexicans—certainly than those of this latter class who inhabit the country around Fort Apache. Children may steal trifles, but they are usually returned. Borrowing, among the Indians themselves, can hardly be said to exist. It is always customary for one who has anything which others have not, to share as long as it lasts. Their liberality to each other makes them wonder at the selfishness of civilized people. Some of the more thrifty of the Indians are, however, taking practical lessons from those about them in the matter of providing for the future; yet they find it very difficult to lay by anything while hungry friends visit them at all hours, privacy being a thing almost unknown in the Indian

scheme of life. There is amongst them a constant round of visiting one of the expressions of that restlessness which keeps them continually on the go.

Mr. Cooley, who lives among them, is often called upon for medicine and food, and they repay his kindness, without any unnecessary words, in their seasons of abundance. One spring when the band was much straitened for food, he supplied a number of them with flour without thought of its return. Some time afterward a quantity arriving, a gift to them from the government, they requested him to send his wagon and haul flour to his storehouse. After a time, needing the room, he sent a message to the chief to remove it, and received the unexpected response that it was his own, in payment for that he had furnished them. If money is borrowed they expect to and do pay as promptly as white people, but ordinarily if any article is received from a white man it is considered a gift, unless return is stipulated.

There is no set time for eating. The proper period for eating, in their estimation, is when they are hungry—if there is anything on hand. They are not ordinarily voracious eaters, but after long privation they will, like their white brothers in similar circumstances, eat until their hunger is appeased—sometimes a great quantity.

In hunting, fire-arms are used, bows and arrows being almost obsolete. Deer are hunted for their flesh and skins, puma and lynx for their skins only. The bear is treated with the utmost respect and is only mentioned in whispers and very politely as "Mr. Bear." It is not hunted, and they will on no account taste the flesh. The Indians scarcely use arrows now, and never poisoned ones, as they go no more to war, and fire-arms are more effectual against the larger game. The poison formerly used by them was made by hanging up the livers of animals until putrid, then mixing with them cactus spines ground into powder, the arrows being repeatedly dipped into the mixture and as often dried. The flesh of animals killed in this way was harmless if thoroughly cooked.

Many birds are eaten, particularly wild turkeys and quail; but geese, ducks and chickens are not eaten, though the latter are raised for sale. Pork is despised; some, nicely roasted was given to an Apache woman as mutton, but, after eating, she was told the truth, and, deeply offended, she made many unavailing efforts to disgorge it. Snakes, dogs and insects are not eaten. They will not eat fish,

nor touch anything on which fish has rested, nor eat off a plate which has held fish. Rabbits and wood-rats are especially esteemed; the latter are hunted with hooked sticks by the boys, who in their summer costume, popularly known as the "gee string," often return to camp fringed around their loins with the rats, the heads having been thrust under the waist-band. Eggs of all kinds are eaten. Milk was not used formerly, but is now to some extent, especially by the children. Salt is much used. Oil they will not touch on any account.

Their vegetable food is quite varied. They raise and use corn, wheat (the government runs a mill for them), pumpkins, beans, potatoes, turnips, onions, cabbages, etc. Corn is one of their most important articles of food. It was formerly ground in a metate, the hulls winnowed out, water and salt added, thoroughly mixed, made into thin cakes, "tortillas," and baked on hot rocks. To preserve it for winter use in the green state, they line a pit with rocks, fill with wood and fire it. After the wood has burned the ashes are cleared out, the pit is lined with corn leaves, the ears of corn, twenty-five to fifty bushels at a time, piled in, covered with shucks and leaves, and over all earth is placed so as to render the pile air-tight. After eighteen to twenty-four hours' slow cooking the ears are taken out and the grains cut from the cob and dried. In this condition it may be kept for a long time. Wild potatoes which abound in their mountains, are boiled and eaten whenever found. Walnuts (the small native species), stripped of their black hulls, are ground up fine with dried roasted agave. The meat of these walnuts is small but sweet, and the shells being ground up very finely with them, act as an assistance to digestion. The mixture forms a grayish mass not unpleasant to the taste, and is one of the choice dishes of the Apaches.

Agaves furnish a considerable portion of their food. Plants just ready to send up the flowering stem are selected and the leaves all cut off, leaving the white solid core which weighs several pounds and in the raw state is very pungent. A pit of suitable size is prepared and heated as for green corn. It is lined with the outer leaves of the agave, the cores placed in the center and covered over first with the tender inner leaves, then with coarse ones, finally with earth, and left to cook twenty-four to thirty hours. When the pit is opened the young leaves, which have become pale brown, are

lightly pressed together in several layers. In this shape they are dried and kept for food, being quite sweet but stringy (the fibrous portion, chewed and rejected, was formerly used for gun wads). The cores when removed from the pit resemble loaves of brown sugar and are nearly as sweet, all their pungency having disappeared. They are soft and greedily eaten. The syrupy juice is sometimes expressed, the children being particularly fond of it. The only net used by these Indians is made from split yucca leaves and is used to carry this cooked agave, called by them "mescal," this term being applied to the plant and all its products.

The Indian granaries are made of woven twigs in basket form, widest at the base, narrowed at the top, covered with plaster of Paris, and mounted on stands some feet in height. They vary in size, but usually have a capacity of several bushels.

The cooking and carrying baskets are made from the twigs of *Rhus aromatica*, which are long, slender and very tough. They are split by the teeth of the women, and rolling up elastically, are tied in that shape for future use. The fruit called "squaw berries" is washed to get rid of the acid exudation, insects, etc., then dried and pounded for food. Acorns are made into meal after the manner of all Indians, but the small sweet ones of the dwarf oak, called "biotas," are eaten like chestnuts, without any preparation.

Mesquit, "ejd," is much used. The pods when ripe are ground fine on a metate, mixed with water and formed into cakes which are baked in the ashes or dried in the sun. Juniper berries are eaten either boiled and the seeds rejected, or the whole fruit pounded up and made into bread. The berries of *J. tetragona* are rather sweet, but those of another species also used are resinous. Grass and sunflower (*Helianthus*) seeds are gathered for food. For this purpose they are parched in a large flat basket, which being thoroughly moistened, the seeds are poured in and hot coals added. The basket is then vigorously shaken with the coals uniformly distributed among the seeds until the practiced eye observes the time to discard the fire. The grains are then ready to be made into flour, which is either used as porridge or shaped into thin cakes and baked in the ashes. Both the porridge and the bread thus made are as well-flavored and nutritious as some of our own articles of food—buckwheat cakes, for instance.

The Apaches are very fond of greens. Species of *Amarantus* and,

Chenopodium furnish the greater portion, the squaws gathering large basketsful daily in the season. At present they use cooking vessels obtained from the whites, but formerly the vegetables were put into baskets with sufficient water to cover them, and cooked by dropping hot rocks (which were handled with wooden tongs) into them. When the cooking is nearly finished, if they have any dried agave root, a portion is soaked, beaten up and added to the greens. It is a sweet, not unpleasant addition, better than some of our condiments. Salt is added to all green vegetables, but they are never cooked with meat. Cabbage is eaten now more or less, but when the Apaches first became associated with whites they greatly disliked it and would hold their noses in passing a place where it was being cooked.

The Coyoteros are exceedingly fond of "Tizwin," a fermented drink made from sprouted corn. It tastes and looks like yeast, but contains sufficient alcohol to intoxicate Indians, when drunk in large quantities, though a white man, even if he could be induced to take it, would probably find it very mild. The use of this drink is discouraged by the government, but the Indians continue to prepare it, not being able to see why, if whisky is good for the white man, their beloved "Tizwin" should not be as good for them.

The tobacco formerly used by the tribe was made from a native species and called "Natoe." It is not now used except by some old men in emergencies, the ordinary article of commerce being obtained from the traders. They have never used pipes, but smoke cigarettes, using formerly for covering, the inner husks of corn, though now cigarette paper is bought from the traders for the purpose.

They are fond of all sorts of games, though foot-ball, which is a favorite diversion of so many of the surrounding tribes, is not played among them.

"Shinney" is played with a ball of hard wood and a hooked stick, which is made by putting the end of a green branch of ash or scrub oak into the fire, until it becomes soft enough to bend into a half circle. It is then tied in this position and left to dry.

Apache billiards or "Pole game," called by them "Najuse," is played with two poles fourteen feet long, each with nine circles cut near the end held in the hand, and a hoop about eight inches in diameter with a string across the center with six marks or cords

around each half. Three parallel embankments are formed from sand or short straw, the two grooves being about as long as the poles and a foot in width. Through these grooves the hoop and poles are thrown. There are two players to each side, the hoop is thrown down the groove of one side and is returned in that belonging to the other. When the hoop is started one player from each side grasping his pole runs swiftly after, trying to pass it through the rolling hoop. When the ring falls on the pole, the game, which may be all the way from twenty to a hundred points as agreed upon, counts according to the number of circular marks of the hoop and pole which come in contact.

In the game called "Satitt," which is played by women, a square about two feet in diameter is formed with a large flat stone in the center. The outer margin of the square is marked by forty small stones, ten on each side, with an interval at each angle. These upright stones are used as counters by the four players who count in different directions, the two opposite being partners. The players kneel outside the square and keep count by sticks which they move from place to place among the rocks. To play the game two sets of three sticks about six inches long and three-quarter inch wide are used. They are round on the back and flat on the face, and being held between the thumb and fingers at about the lower third, which is marked on the flat face by a diagonal black line, are suddenly struck on the central rock and allowed to fall. If the three round sides are upward, they count ten, the three flat sides count five, two flat and one round count two; two rounds and one flat count three. The player making ten points is entitled to another throw. They continue playing until one side has won three games. To obtain good luck they, like many of their not much wiser white brethren, resort to tricks and charms. They sometimes substitute one set of sticks for the other; strike each separately on the center rock before playing, or even break off the end of one of the sticks.

Both men and women play cards with either the ordinary American or the Mexican packs. Formerly the only cards in use were made by themselves from horsehide. They were ornamented to represent the Mexican Monte deck, the figures rudely executed, but the colors well laid on—if such a pack is now wanted an Indian will charge three or four dollars for making it.

Women are as passionately addicted to gambling as the men, and either sex will lose money, clothing, ornaments or any of their possessions with as little murmuring as any other race of people—gamblers are gamblers whether red, white or black.

OBSERVATIONS ON THE LIFE HISTORY OF THE
HOUSE FINCH (*CARPODACUS MEXICANUS*
FRONTALIS).

With Plate VI.

BY CHARLES A. KEELER.

There is probably no bird so widely and commonly distributed throughout the Western States as the house finch. From the Rocky Mountains to the Pacific and from Oregon into Mexico it is found in abundance. In California it resorts chiefly to the valleys, both of the coast and interior region, but it occurs in the mountains to the height of at least three thousand feet. Its distribution in winter does not differ essentially from its summer range, as its migrations are caused merely by local influences, such as scarcity of food or a cold spell. In the vicinity of San Francisco Bay the bird is present throughout the winter, but is less common than at other seasons, being driven inland by the cold weather.

During the month of February the males sing more or less constantly, but it is not until a month later that love-making begins. Early in March they begin to pay their attentions to the females, and at this time it is a common sight to see two males trying to outvie one another in song as they follow a female from tree to tree. By the middle of March they are nearly all mated and by the latter part of the month nest-building is fairly under way. During the early part of April both sexes are busy in constructing a home, the male merely assisting by bringing material and finding abundant opportunity to sing while his mate is at work. To describe the location of the nest would be impossible, as there are few birds less particular in the selection of a site. Vines and bushes about houses seem to be chosen more commonly than trees, although fruit trees afford shelter to a great many nests. From the middle of April to August the duties of incubation occupy the attention of the female almost constantly, for during this time two broods are raised. Four

or five eggs generally constitute a set, although I have found several sets of six and one of seven.

After the first egg is laid the female begins to set. In this duty I have never known the male to assist, although he is a very attentive consort, remaining constantly near the nest while his mate is setting, and accompanying her whenever she leaves it. This year an especially favorable opportunity was presented to me for observing the nidification of a pair of these birds, and as it is essentially the same in all cases, I will describe it in detail. The nest was situated in a bush at the height of about five feet, and the first egg was laid on May 14. On the 18th the fifth and last egg was in the nest, one egg having been laid each day. The female began setting after the first egg was laid, but less constantly than later on. For the first few days she was undemonstrative when I approached, quietly leaving the nest and returning directly to it as I withdrew, but as the time for hatching drew near she showed great uneasiness, and the male even joined with her at times in hovering about the nest and uttering cries of alarm. On May 31 the first egg was hatched, having been incubated thirteen days; and before the day was past a second was pipped. This egg did not hatch until the evening of June 1, and on the next morning a third egg had hatched. The other two were pushed out of the nest and destroyed, but whether by accident or design I was unable to determine.

Figure 1 of Plate VI represents a young bird on the day of hatching. The appearance of the young, especially at this stage, is anything but prepossessing. It is nearly naked; its wings and legs seem like mere useless appendages stuck on to its sides; its eyes are closed but protrude on the sides of the head like two dark-bluish balls; it has a prominent round pot belly which is covered with a smooth shiny skin, and certainly does not add to the beauty of the creature. An apology for feathers grows upon certain restricted areas of the bird—on the head, the dorsum, and the flanks. These feathers are white and erect, the longest of them being from eight to ten millimeters. They are the most rudimentary of feathers, consisting of but two parts, the stem and barbs. The barbs are so fine that they are very inconspicuous and the feathers have the appearance of fine white hairs, quite limp and wavy in texture, but perfectly erect. These feathers are certainly worthy of a name.

Nitzsch says of them:* "The downy covering of newly-hatched young birds consists, according to some authors, of down-feathers, and according to others, of hairs; in most birds, however, it is formed neither of one nor the other, but solely of early-deciduous, down-like, or setiform processes, seated upon the apices of the first-formed barbs of contour feathers, or even of down-feathers." In Coues' Key, which follows Nitzsch very closely in regard to feathers, I can find no mention of this early growth. In the absence of any name for them, I would suggest that they be called *piloplumules*. Figure 4 shows one of these piloplumules greatly magnified. The shaft is a long, slender, solid stem, with alternate branches or barbs placed at considerable intervals apart. Just what the use of these feathers is it would be difficult to say, as they seem hardly continuous enough to afford any protection from the cold. The fact that they occur only on the upper part of the body would seem to indicate, however, that their use must be to protect that region which is most exposed in birds while in the nest.

Figure 2 is a back view of the same bird on the day of hatching. Figure 3 represents the bird on the third day. It will be observed that the feathers on the breast have made their appearance, thus affording an opportunity of noting the bird's pterylography. The feathers on the gular portion are few and scattered, but soon divide into two distinct bands on the truncal portion. The lateral tract appears contemporaneously with the others, and is distinct and well marked.

It will be noticed that on the day of hatching there is no indication of an ear passage. By the third day, however, a dent appears in the skin. This dent is more pronounced on the fourth day, and on the fifth a small orifice is pierced. The eye, which is closed on the first and second days, has a small slit in it on the third day. On the day following the slit is more distinct, and on each succeeding day it opens wider, until the end of the first week when it is completely open. It does not open it to the fullest extent, however, before the tenth day. The claws are present when the bird is hatched, but very small and perfectly smooth. It is not until the seventh day that the scutella become visible on the feet and metatarsus. On the eighth day they are much more pronounced, and

* Pterylography, p. 14.

grow more sharply defined each succeeding day. The shape of the bill undergoes a decided change. At first it is soft, being but slightly harder than skin, and its contour is perfectly regular. Each day produces a slight change in its shape until the end of the first week, by which time it has assumed a form very similar to that of the adult bird, and from this time on it hardens very rapidly.

In the young bird the skin is extremely transparent, so much so that the food can be distinctly seen in the crop. The crop is but little distended on the first two days, but by the third day hangs about the neck like a loose sack. It contains fine particles of green food, much of it appearing to be the fine undeveloped seeds of some plant. The growth of the young bird is rapid and constant. In ten days the chord of the culmen had grown from four to eight millimeters, the gape had increased from five and a half to eleven millimeters, and the tarsus from five to fourteen millimeters. In fact, the bird just about doubled its size in these first ten days. The feet develop more rapidly than any other part, and the head is the slowest in growing.

From the third day on, the growth of the feathers is continuous. At that time the wing quills first make their appearance, and by the sixth nearly all the feathers have sprouted. Figure 5 represents the bird on the eighth day. By this time the feathers on the breast have begun to emerge from their sheaths, giving the fledgling quite a novel appearance. It now looks much more mature, as the legs and wings are better proportioned to the size of the body than during the earlier stages, and the belly is slowly growing less prominent. Figure 6 shows a rear view of the same bird on the following day. The remarkable growth of the wing quills is one of the most interesting features. The distribution of the dorsal feather tracts is also shown in this figure. Figure 7 is a front view of the bird on the eleventh day. The wing quills are still growing rapidly, and the ear coverts, which are the last feathers to sprout, have made their appearance. The tail feathers, which were first noticeable on the ninth day, are growing quite fast, although their development is slower than the wing quills. It will be noticed that the piloplumules are still present. Though less erect than at first, they are not shed until all the feathers are grown, and I have noticed them in the head of a fully developed bird.

The male does not appear to aid in caring for the young. The

female remains on the nest a good part of the time for the first five days after the first egg is hatched, but after that time is absent much more frequently and for longer intervals. By the tenth day the young have become very active, and are able to crawl about with considerable rapidity if placed on the ground. At this time the sheath which incloses the feathers begins to flake off, and the bird is covered with fine particles of this epithelial case. Figure 8 represents a feather emerging from its sheath, as seen under the microscope. The sheath, it will be observed, is cracked, and the pressure of the growing feather causes it to crumble or flake in fine particles. At the end of two weeks the bird is almost completely covered with feathers, and is able to fly from the nest.

By the fruit-grower the house finch is generally looked upon as a great pest, and is destroyed whenever the opportunity is presented. Whether or not the amount of damage done by the bird is sufficient to warrant keeping it seriously in check, seems to me to be still an open question. There is no doubt that it does destroy a very considerable amount of fruit, and I know of no real service that it renders the horticulturist, but interfering with the balance of power in nature is always a dangerous experiment. Wherever it is scarce the English sparrow is proportionately abundant, and it seems not impossible that the one may supersede the other in course of time. If it were a matter of choice between the merry, bright-plumaged house finch, with his exquisite bubbling song, and the detested sparrow, I think that few would question the advisability of sparing the former. All of the more juicy fruits are eaten by the house finch, but cherries generally suffer most. On talking with a fruit-grower in Berkeley, who has an extensive cherry orchard, he informed me that the number of cherries destroyed by "linnets" is comparatively trivial, although the birds are very numerous. Most of the fruit lost was in the tops of the trees, where it is least easy to pick. Until the subject has received more extended and more careful consideration it seems prudent to let the birds live.

Sagittaria Chinensis, reported by Mr. S. B. Parish, from San Bernardino, is reported from Howell Mountain, Napa County, and has just been brought to us from Sonoma by Mr. John MacLean. The climate evidently suits it, and it might be introduced with advantage into our great tule marshes.

YOSEMITE LEPIDOPTERA.

BY H. H. BEHR.

A small collection of Lepidoptera caught by Mr. Julius Starke exclusively in Yosemite, which has been recently sent to me, shows some interesting facts in regard to distribution, and throws a little light upon the complicated questions concerning the Argynnides of the Aglaia type.

1. *Danais Plexippus*, specimens 6.

One would hardly expect to find an insect belonging to a tropical family at so high an elevation, but I am told that it is abundant at Reno, Nevada, its larva feeding on a species of milkweed, *Asclepias erosa*, which grows there in great quantity.

2. *Argynnis Leto* Behr, specimens ♂ 8, ♀ 5.

3. *Argynnis monticola* Behr, specimens 4.

4. *Argynnis Zerene* Boisd., specimens 6.

All the specimens are of regular type, no transitional forms among them, and compared with other specimens, give evidence, at least, of their specific distinctness. If intermediate forms occur, they certainly should do so in a locality where the three species are common.

5. *Melitæa montana* Behr, specimen 1.

6. *Melitæa Hoffmanni* Behr, specimen 1.

7. *Grapta Zephyrus* W. H. Edwards, specimens 5.

8. *Vanessa Antiopa* L., specimens 5.

9. *Pyrameis Cardui* L., specimens 5.

10. *Limenitis Lorquini* Boisd., specimens 7.

11. *Limenitis Bredowii* Hub., specimens 8.

12. *Thecla sepium* Boisd., specimens 3.

13. *Lycæna Acmon* Doubled. (*Antegon* Boisd.), specimens 2.

14. *Lycæna Piasus* Boisd., specimens 4.

15. *Polyommatus Arota* Boisd., specimens 5.

16. *Colias Chrysotheme* Esp., var. *Eurytheme* Boisd., spec. 12.

17. *Pieris Napi* L., var. *pallida* Scudd., specimens 6.

18. *Neophasia Menapia* Feld., specimens ♂ 6, ♀ 8.

19. *Papilio Zolicaon* Boisd., specimens 3.

20. *Papilio Rutulus* Boisd., specimen 1. (*Papilio Eurymedon* seems not to enter the valley.)

21. The ubiquitous *Deilephila lineata* L., specimens 4.

Besides these there are some fragments of a *Nisoniades* and a *Pamphila*, but the material is in such a poor state of preservation that accurate identification is impossible and the same is the case with some *Geometrides*, probably new species belonging to the genus *Selidosema*.

Imperfect and fragmentary as the material is it presents many points of interest.

First.—Among the twenty-one species of the list, there are but six (*Neophasia Menapia*, the two species of *Melitæa*, and the three species of *Argynnis*), not represented in the fauna of the immediate vicinity of San Francisco. Of course the collection of a professional entomologist would establish an entirely different proportion, nevertheless the great preponderance of species endemic to the Coast region, shows that there is much more affinity between it and the Sierra Nevada, up to 4,000 or 5,000 feet, than there is for instance between the insect fauna of the Andalusian Coast and that of the Sierra Nevada of Grenada; between Marseilles and the upper valley of the Rhone; or to keep in our own neighborhood, between the lowlands near the Gila and the Sierra separating the waters flowing into the Pacific, from those of the Gulf of California.

This mixture of the Coast types with those peculiar to the Sierra is only another link in a long chain of analogies, found not only in the fauna but in the flora as well—as in the case of the Douglas spruce (*Pseudotsuga Douglasii*), and the tan bark oak (*Quercus densiflora*), which skip the broad central valley of the State and reappear at about 4,000 feet in the Sierra Nevada. *Habenaria*, *Epipactis*, *Spiranthes*, *Eriophorum*, *Menyanthes*, etc., have a similar distribution, and as a striking Entomological instance, I might mention *Parnassius Clodius*, occurring near Tomales Bay, though usually subalpine in the Sierras. A possible explanation of these peculiarities of distribution of many of the Californian species may be found in the Arctic current that strikes our coast and follows it as far south as Monterey, the vapor constantly arising from the current accompanied by a lowered temperature facilitating the adaptation of coast organisms to the Sierra, and those of the Sierra to the Coast Region.

Second.—Among the types not represented near the coast is one, *Neophasia*, whose only known species (*N. Menapia*) inhabits the higher Sierra, but descends in Vancouver Island to the coast.

Its nearest relatives, *Eucheira socialis* and *E. Terlootii*, belong to the Mexican Sierra Madre, and if of a distinct genus form, a transition between it and the Central American *Dysmorphia*, in the same way that the European *Leucophasia* connects the amphitropical *Terias* (*Heurema*) with the gerontotropical *Pontia*.

Third.—There remain as the only endemic species two *Melitæas* and three *Argynnides*, all extending northward into Oregon. No one of them represents an isolated type. They form links in long series of modifications that are still a puzzle to systematists and are quoted as undeniable proofs of Darwinism.

If so, none of the species can be considered as in *statu nascendo*, at least all the specimens are well defined and do not show any transitional characters, and though it cannot be denied that intermediate ill-defined specimens are met with in other localities, this is not the place to enter into such complicated questions, nor has sufficient material been collected to admit of any generalizations which would not be subject to constant modifications.

THE HEDGEROWS OF TODOS SANTOS.

BY T. S. BRANDEGEE.

During the month of January last, I found myself at the little town of Todos Santos, on the peninsula of Baja California, nearly under the Tropic of Cancer. This Todos Santos must not be confounded with Ensenada de Todos Santos, at the northern end of the peninsula. It was very difficult to reach this small out of the way place, situated on the shores of the Pacific Ocean, and the route I chose was by a trail one hundred and eighty miles long, which was followed on horseback with a Mexican boy, Jesus Selgado, for a guide. Heavy rains had fallen in September, and the vegetation came rapidly forward and either matured its fruit or withered in the succeeding dry weather. At the beginning of my long ride there fell a steady rain of two or three days' duration, and for quite a while our horses waded through water and mud sometimes two feet deep, but the hot sun soon dried out the soil, and in a few days it assumed its usual barren appearance. Todos Santos is not a port of entry and cannot be reached by steamer from any place, most of its commerce being carried on by way of La Paz. The town is built

in the usual Mexican fashion, mostly of adobe, and is situated upon high dry ground overlooking the irrigated fields and gardens. No stream runs from the adjoining high Sierras, but the water rises from the earth and is carried round about in irrigating ditches, so that a lowland two by three miles in area is watered, remains green and is a veritable oasis in the uninhabitable surrounding region. This tract is divided into small farms, separated from each other by dense hedges, six to fifteen feet high, composed of the native plants, and the paths or trails (there are no wheeled vehicles in the region) are bordered on both sides by these high walls of vegetable growth. Now and then a cotton-wood or a tree-like *Celosia* grows in them, or sometimes an escaped guava is seen in full bloom, but it is mostly composed of large herbaceous perennials, nearly all different from those of Alta California. Every one who collects plants in southern Lower California is certain to bring away that most showy scarlet *Antigonum*, or "Flower of St. Michael," and these hedges in many places are blazing with it. Another conspicuous flower climbing over tall *Bebbias* and the *Asclepiads*, is the bright yellow *Ipomæa aurea*. This is a most handsome and little known perennial, large-flowered "convolvulus," and if possible should be introduced into general cultivation. Two magnificent *Viguieras* (*V. deltoidea* and *tomentosa*), often fifteen feet high, overtopping the other growth with their numerous sunflower-like blossoms, furnish much of the yellow for these many-colored hedgerows. Another of the tall plants but not a common one is *Cæsalpinia*, with its long stem and terminal yellow raceme waving in the wind. A single flower of *Jacquemontia abutiloides* is not very large, but the plant bears such a host of them that they almost hide the leaves with a cloud of blue, especially where the hedgerows are not so rank. *Rivina*, *Rhynchosia*, *Phaseolus* and *Ipomæa*, with their slender and twining stems, bind the whole together, and their small, different-colored flowers add to its beauty. At the foot of this luxuriant vegetation grows a fern (*Gymnogramme trifoliata*) sometimes taller than a man, and along the base there is often a pretty undescribed *Hermannia*, or, if an irrigation ditch is near, the ground may be carpeted with a small-flowered *Commelina*. Other plants not so attractive to the general observer, but very interesting to botanists, find a place to their liking under the protection of these hedges.

In the town nothing grows, and the whole surrounding region

has a dry, sun-burned look, excepting during the rainy season; so that the view of the lower irrigated ground, with its orange and guava trees, its bananas and cocoa palms, and the large sugar-cane fields is heightened in effect by contrast with the dry, dormant, rain-awaits upland vegetation. Some native plants scattered in the smaller drier hedges are so handsome that they seem like flowers escaped from cultivation; one especially (*Dysodia speciosa*) always looks out of place when its tall, weak stems, supported by some insignificant leafless bush, are gay with many of its variegated flowers. *Hibiscus ribiflorus* is another that commands notice. Its stem is sometimes eight feet high, and near the ends of the branches are bright yellow flowers, two or three inches in diameter. At the lower (western) end of the fields is the fine sandy ocean beach, with its semi-tropical plants, many of which, as *Ipomœa Pes-capræ*, *I. acetosifolia*, *Scarvola*, *Maytenus*, etc., reach also to Florida on the Atlantic Coast, and back of them, only twenty miles eastward, rises the high steep mountain of the Sierra de la Laguna, with a widely different flora, abounding in leguminous trees—*Tecoma stans*, with its large yellow blossoms, arborescent *Nolinas* and *Polygalas*, and many plants belonging to a more northern flora, as blackberries, strawberries, the black currant (*Ribes sanguineum*), pines, oaks, the Toyon (*Heteromeles arbutifolia*), and the madroña.

NOTE ON TYPHILOGOBIUS CALIFORNIENSIS.

BY ROSA SMITH EIGENMANN.

The following notes, taken at San Diego July 3d, 1882, but not hitherto published, may supplement the statements made by C. H. Eigenmann (Zoe, May, 1890) concerning the tenacity of life of the Point Lomo blind fish.

Three specimens were secured and were placed alive in a two-quart tin pail along with seaweeds, polyzoa, hydroids, living mollusks, a sea-cucumber, and a number of small fishes and crabs. The living forms in the pail were so crowded and so short of water that all the fishes except the three pink blind fish had died before I reached home, the drive of twelve miles being over a hilly road for some distance, thence across the sandy river-bed over which the San Diego river formerly flowed into the bay, and along the bay

shore where deep ruts were cut in the road at this, the dry season of the year. When returning from La Jolla and other points along the sea beach, I have frequently carried home the tide-pool species alive in the same manner, and, invariably, the *Oligocottus analis*, one of the small Cottidæ, was more tenacious of life than any of the other species. At this time, however, *Oligocottus* expired with the rest, leaving the blind fish to claim the honor of being the most hardy of the smaller species of the region. This species is scaleless and exceedingly slippery. I took one of these examples from the pail, when, like an eel, it slipped through my fingers into a barrel of rain-water standing near, swimming around in the barrel several times. I then removed it to a clean shallow dish into which I had poured about half a cupful of sea sand together with the small amount of dirty sea water which had covered the medley of animate beings before mentioned. *Typhlogobius*, still active, tried to bury itself in the sand, but the dish was too shallow, and several efforts proved unavailing. When touched on the tail it turned quickly around. It was still quite active five hours after it was removed from among the dead fishes. How much longer it may have been able to survive I do not know, as I then killed it with alcohol.

NOTES ON THE NATURALIZED PLANTS OF SOUTHERN CALIFORNIA, IV.

BY S. B. PARISH.

GRASSES.—When *Lamarckia aurea* was collected in 1875 by Parry and Lemmon it had not been previously observed on this continent. They discovered it growing in the sandy bed of Mill Creek Cañon,* where that stream breaks from the San Bernardino Mountains, a place in which, as Dr. Parry wrote, “one would hardly expect an introduced grass.” It is, however, a favorite camping place for fishing parties, who may easily have brought the seeds from Los Angeles, where there is reason to believe that this species was at that time already established. It continued, however, to be a scarce plant for many years, so that the finding of an occasional

*The station “Colorado Desert,” given in the Botany of California, ii, 299, is an error.

specimen of this beautiful little grass was for a long time a rare event in my herborizings. But year by year it has become more abundant until it is now common throughout the San Bernardino Valley and the surrounding foothills. It is equally abundant in the vicinity of Los Angeles, and is also said to grow in San Diego County.

Three European species of the genus *Bromus* are of very recent introduction in this region. *B. mollis* has been sent me by Dr. H. E. Hasse, who collected it in May of the present year at Santa Monica, under conditions which made evident its recent intrusion. There is no record of its having been found previously in the State. *B. maximus* had been collected at San Francisco, and *B. rubens* in Plumas County at the time Dr. Thurber elaborated the grasses of California,* and these two stations remain the only ones published. It is doubtful, however, if either species was as scarce as this scanty record would indicate. In my own neighborhood both have made their appearance very recently. *B. maximus* was first observed only two springs ago near Governor Waterman's residence in the foothills north of San Bernardino. There were some two or three hundred plants, scattered along the roadside and through an adjoining field of grain, no more than might easily have been the progeny of a single individual of the year before. In the two succeeding years it has become quite abundant by the roadside for a mile up the cañon. During the present spring a few plants of this grass have been seen in two places near the town of San Bernardino, more than six miles from the first station. *Bromus rubens* first appeared the same year in Reché Cañon, on the opposite side of the San Bernardino Valley, and also by the roadside. It likewise has multiplied abundantly and has spread itself about the same distance up this cañon. It is a curious circumstance that in both these instances the plants have spread for a long distance up, and not at all down the cañons, but it is not easy to assign a cause for this peculiarity. All three of these bromes were probably introduced in foul seed grain. It may not be out of place to mention here a fourth species of this genus which has established itself a little outside of the limits to which these notes are properly confined, and which is of some interest as it has not heretofore been detected in the United States. This is *B. Madritensis*, and like the

*Bot. Cal., ii, 319.

others it is a native of southern Europe, a region which has so liberally supplied our exotic flora. It is quite a conspicuous grass, the panicles, and indeed the whole plant, being usually of a very dark purple color. The only known station is at Fort Tejon in Kern County, where it is abundant under the noble oaks that embower the crumbling buildings of that deserted post. *B. secalinus*, the well-known "cheat" of farmers, although usually found wherever grain grows, has not yet been detected in this region.

Eragrostis pilosa is widespread in the Eastern States of the Union, being found, according to the Manual, from "southern New England to Illinois, and southward." To this extended range California may now be added, it having been found in 1882 growing along the embankment of an irrigating canal, near Santa Ana, Orange County.

Polypogon Monspeliensis is sometimes called "Foxtail," from a fancied resemblance of its dense panicle to the bushy tail of that animal. It is a common grass throughout all this region, but not "chiefly in the mountains," as Dr. Thurber supposed.* It is indeed to be found there, but it mostly abounds in the meadows and pastures of lower altitudes, and especially in those places where the soil contains a taint of alkali. Although stock will eat it in its earlier stages, it has little economic value, and in a riper condition is very annoying by reason of the abundant awns, which work in about the teeth of animals feeding on it.

Hordeum murinum is equally abundant, and even more pestiferous. It shares the name of Foxtail with the former species, but is more frequently called Squirrel Grass. It is especially abundant in pastures which have been overstocked, where "partly because of its worthlessness when green, partly because it is an enemy to stock when ripe, and partly because of its means for dissemination and self-planting, this pernicious species can hold its own where better kinds are exterminated."† The ripe heads fall to pieces, and by means of their barbed awns attach themselves to the hair or wool of domestic animals, causing irritation and sores, and even penetrating the flesh. In the mouth they give rise to extensive ulceration of the gums, the ulcers becoming filled with dense masses of awns, making

*Bot. Cal., ii, 270.

†Brewer, Pasturage and Forage Plants, p. 9.

it very painful for the animal to eat. They also get into the eyes, often, it is said, destroying the sight. If fed off before it heads out it affords a considerable amount of pasturage, but of an inferior quality.

The wild oat (*Avena fatua*), although also possessing an objectionable awned seed that is capable of boring into the flesh and causing much annoyance and damage, yet has sufficient value to overbalance its evil qualities. In places it covers hundreds of acres with self-sown grain. It forms a luxuriant and nutritious pasture, starting up with the first rains and requiring less moisture than the cultivated grains for perfecting its growth. Cut early, it makes a hay that is much relished by horses and mules. Although present to a greater or less extent in all Californian grain fields it is not often injurious to them, unless very foul seed has been used. In what are called "volunteer" crops—that is, self-sown ones—it is frequently so abundant that they must be cut for hay. Although so valued by us it has acquired a bad reputation in some of the older States where it has found its way. Thus, having been accidentally introduced some years ago in a certain part of Wisconsin, it is said* to have soon taken possession of the land, effectually running out any other crop, and becoming the worst pest of the region.

Panicum sanguinale, commonly known as crab grass, is abundant here in cultivated districts, as it has become in most of the warmer regions of the world. It is especially prevalent in orchards, corn-fields and gardens. *P. Crus-galli*, a species of equally cosmopolitan distribution, has been thought by some to be possibly indigenous in some parts of the country, but here it is obviously an intruder, and grows in similar situation with the last species, but more especially along the edge of ditches. In like places also is found *Cynodon dactylum*, "Bermuda grass," another widely distributed native of Europe. This species is rapidly increasing in abundance, and is now often to be seen in damp soil in the foothills, quite remote from any settlement. In some of the Southern States it is considered a valuable pasture grass, but it has not been found so here. In conjunction with *Paspalum distichum* "Devil grass," a native species of similar habit, but of more robust growth, it often overruns alfalfa fields, entirely superseding the original crop.

*Vasey, Agr. Grasses of the U. S., 1st Ed., p. 76.

Lolium temulentum is quite widely distributed, both in cultivated and uncultivated lands, but never abundant in either. *L. perenne* can hardly be called more than an occasional waif.

Poa annua is of frequent occurrence in tilled lands and about houses. It is thought to be indigenous as far west as Arizona,* but with us it does not occur in situations that would indicate that it is so here. *P. pratensis*, on the other hand, is certainly native, being not uncommon in remote mountain valleys at six to seven thousand feet altitude, where it often forms a considerable part of the natural meadows. About towns and farms it probably is usually an escape from cultivation.

Andropogon Sorghum, var. *halapensis*, a plant with an unusual number of popular *aliases*, was introduced to cultivation in California under the name of Evergreen Millet some six years ago, and with such high laudation that farmers very generally experimented with it. The results were not satisfactory in competition with alfalfa, and its culture is entirely abandoned. It remains, however, as a naturalized plant, being often seen, at least in the San Bernardino Valley, by stream banks, roadsides, and sometimes as a troublesome weed in arable lands.

Phalaris Canariensis, the grass which produces the common canary bird seed, is very likely to occur in waste places, but I have no evidence of its being found within our limits, except, very unexpectedly, at San Clemente Island,† where it was collected by Mr. Lyon, and since on the adjacent island of Santa Catalina by Mr. Brandegee.‡

Phleum pratense. The "timothy" of Eastern hay-fields has also turned up in quite as unlikely a place, having been collected in 1888 by Dr. Palmer, at Victor, on the Mojave Desert, where he reports it growing on the banks of the river of the same name, "out of the reach of stock."§ Its presence in that place is the more remarkable from the fact that this grass is not cultivated in southern California. But as Victor is a station on the Santa Fé Railroad it is probable that the seed may have been brought by some car from

*Thurber, Bot. Cal., ii, 311.

†Lyon, Bot. Gaz., xi, 335.

‡Zoe, i, 115.

§Cont. U. S. Nat. Herb., No. 1, p. 8.

the part of the country where it is such a common crop. At present it is perhaps best to consider it as a transient rather than as a permanent addition to the list of exotics.

Cenchrus echinatus I hope I am right in regarding in the same way, although I do so with less confidence, as it is a pest well suited to our climate, and which sooner or later is almost certain to be troublesomely abundant. It is indigenous, to all appearances, as near us as Arizona, and its bur-like involucre affords it facilities for transportation not surpassed by any other member of the order. It is therefore rather a matter of surprise that it has not been heretofore reported from this State. Half a dozen vigorous plants were discovered this spring in an orchard near San Bernardino, no doubt the first offspring of a single head. Fortunately they were not yet in fruit, and were at once eradicated, but it is hardly to be hoped that this was the only point of infection. *C. tribuloides* is mentioned in the Botany of California, but without the naming of any station, and it is not known to occur in this part of the State.

Festuca Myurus is usually regarded as an exotic species, although Dr. Thurber must have felt some doubt regarding it, as he speaks of it* as only "probably introduced." It has a very extended range, not only on the Atlantic side of the continent but on the Pacific as well, where it is found from San Diego at least as far north as Oregon. In southern California it presents no appearance of an introduced species, not occurring in cultivated grounds or about habitations, but abundantly through the foothills and mesas. It is perhaps hardly safe to claim it as indigenous, but if placed in the list of naturalized plants it must be with some doubt.

Another doubtful species is *Lcercia oryzoides* Swartz. The only California station from which this has been reported heretofore is Cache Creek, in the central part of the State, where it was collected by Bolander, under circumstances which inclined him to "regard it as introduced."† I am acquainted with it only along the edges of a single stream, at Kehl's Mills, near San Bernardino, where I first observed it in 1883, in no great quantity. It has now extended down the stream for more than a mile, sometimes choking the current by its abundance. Unless further observation should

*Bot. Cal., ii, 316.

†Bot. Cal., ii, 262.

show that it is more common than it now appears it would seem most proper to class it as an introduced species. There are some slight differences between our plant and Eastern ones, the panicle in ours being hardly exserted from the sheathing leaf, and the time of flowering much later, namely early in November, while according to the Manual it flowers at the East in August. The difference of climate, however, is quite sufficient to account for these variations.

Orchard grass, *Dactylis glomerata*, is found, although but rarely, as a roadside waif, although it is not a species which is cultivated here, and the present summer a few plants of *Setaria viridis* were found by the highway near Rialto, San Bernardino county. It also is as yet a mere waif, but from its well known character it is to be anticipated that it will soon establish itself among our naturalized plants.

LAVATERA—IS IT AN INTRODUCED PLANT?

BY T. S. BRANDEGEE.

The notes on *Lavatera* in the June number of this journal, by bringing the plant to the notice of a wider circle than is usually reached by more technical publications, has thrown an unexpected light upon its origin.

Miss Louise A. Littleton, of Glendale, Fresno County, writes :

“I was taught in a convent school, in my childhood, that *Lavatera* was an introduced plant, and the same statement was made to me later by a Franciscan friar at Santa Barbara. He said that the missionaries were scattered over all the coast, and saw nothing to remind them of home, so they introduced a number of plants, one of them being the luxuriant ‘*Malva rosa*.’ The Franciscans were the Mission fathers of the early settlement of California, and though their places have been gradually filled by members of a different order, so that of their once numerous establishments only the single one at Santa Barbara now remains, that one which forms the link between the present and the past, is the storehouse of the early traditions of the coast.”

Mr. E. J. Molera kindly undertook to make the necessary inquiries, being well qualified therefor, not only by his native language but by wide acquaintance among our Spanish-speaking population.

The following responses to letters of inquiry enclosing specimens of *Lavatera assurgentiflora* have been received:

From Father O'Keefe, O. S. F., Superior of the Mission at Santa Barbara:

"Your favor of the 16th inst., with leaf, flower and seed of 'Malva rosa' received in due time. In answer I beg leave to state that, although I believe it was brought by some of the Fathers, or by Don José de Galvez, who ordered seed of every kind of fruit, flower and vegetable to be packed for the new missions, in 1768, yet there is no special authentic record of this particular plant, at least I have not yet seen any stating by whom it was brought." * * *

Father José Godiol, O. S. F., now stationed at Watsonville, who has been a much longer time in California, writes:

* * * "In regard to what you ask me about the enclosed plant, I say to you that you may be assured that it, with many others, was imported to this country of California by the Franciscan Fathers at the time of the conquest of this country. This is well authenticated by the old Padres and old men of this country."

The Californian nativity of *Lavatera* has always been doubted, and nearly every botanist who has dealt with the genus has felt called upon to mention the similarity of our species to some of those of the old world. It lacks entirely that expression of harmony with the environment which we are accustomed to see in plants unquestionably indigenous. *L. assurgentiflora*, the species to which the above letters refer, is very widely distributed. It is cultivated in gardens as an ornamental flowering plant as far north as Mendocino County and through the interior valley and the foothills of the Sierra Nevada, and plants of apparently great age are to be found about most of the old missions and cemeteries. It is reported as growing abundantly in certain places in Texas, and Mr. J. R. Scupham has in his garden in Oakland plants of large size, the seed of which is said to have come from somewhere in South America.

Plants from the sea coast and from the islands differ notably from the form usually seen in the interior, being stouter, with more and much larger leaves, and larger flowers and fruit. The lower half of the corolla is often white, veined with rose, answering almost exactly to the description of those of *L. venosa* (as given in Garden and Forest, iii, 379), which appears to be hardly more than a geographical variety of the former.

Lavatera is either exterminated, or is in the way of being so, from all the islands used for pasturage, persisting only on the detached rocks and islets, which are out of the reach of goats and sheep. The process of destruction may be witnessed at the present time in the environs of San Francisco. The outlying lands are being subdivided for building lots, and the market gardeners who formerly occupied many of them have moved to other quarters. The *Lavatera* windbreaks no longer protected, survive but a short time. Along the avenue leading to the Marine Hospital the gardens were abandoned about two years ago, and the rows of *Lavatera* are now nearly destroyed, although many of them were of sufficiently large size to bear the weight of boys climbing among their branches.

The question as to whether *Lavatera* was introduced or not, should be easy of settlement; if not by the rather vague descriptions, certainly by direct comparison of all the species.

If the plant was brought from Spain, as claimed, then it must have been in common cultivation in that country a hundred and fifty years ago, and although that period of time may have sufficed in a different climate to produce a slight modification of the type, it probably is not greater than the observed variation.

If *L. assurgentiflora* was introduced of course the other species were also, and it is not at all difficult to see how they might have reached the islands, most of them then peopled by Indians, special objects of interest to the Mission Fathers. Indeed it is probable that in regard to the source and date of introduced plants on this coast, too little attention has been given to the comparatively free intercourse between this and other Spanish countries in the latter half of the last century.

RECENT LITERATURE.

Elements of Structural and Systematic Botany for High Schools and Elementary College Courses, by DOUGLAS HOUGHTON CAMPBELL, Professor of Botany in the University of Indiana. 8vo. pp. 253. Ginn & Co., Boston, 1890. This little book represents the modern ideas of structure and relationship, and the author in his preface makes a much needed protest against the "only too prevalent idea that the chief aim of botany is the ability to run down a plant by means of an 'Analytical Key,' the subject being exhausted

as soon as the name is discovered." The illustrations are a welcome change from the hackneyed stock in trade, nearly all of them having been drawn by the author. The book contains brief chapters on histological methods and on the fertilization of flowers, and although it presupposes a knowledge of forms, and differs radically in classification from all our Floras, it will be found a very valuable addition to our list of botanical text-books.

H. H. B.

Synopsis of the Genera and Species of Malvæ, by EDMUND G. BAKER, now being published in successive numbers of the *Journal of Botany*, is of much interest to American readers. In the case of the species of *Lavatera*, credited to America, however, the differences in their floral characters are not so great as stated—the author was probably misled, as were the original describers, by the dried flowers.

Cucurbitacearum novum genus et species, by A. COGNIAUX, extract from *Proc. Cal. Acad.*, Ser. 2, iii, pp. 58–60. In this paper is proposed a new genus, *Brandegea*, near to *Cyclanthera*, with two species *B. Bigelovii*, which has been referred doubtfully to several genera, and *B. monosperma* (described originally as *Cyclanthera monosperma* Brandegee, but subsequently considered by him to be only a form of the former species); also *Echinocystis Brandegei* a rather remarkable species making a new section in the genus.

Catalogue of North American Shells, collected and for sale by Henry Hemphill, San Diego, Cal., 1890. The prefacing note to this list furnishes strong evidence of the value of the collection. The author's views are evidently the result of painstaking study and comparison of long series of forms, and in these days when collections are too apt to be valued in proportion only to the number of "new species" they contain, show a disinterestedness, and a soundness of judgment worthy of imitation. The author says: "The large number of varieties offered adds very much to the value of the series, but it must be understood that some of them do not represent very great differences from the preceding or the following variety or species, the object being to show their relation to one another by a closely graded series of intermediate forms. * * I have reduced many of the so-called species to varieties, and am convinced that very many more should be treated in the same man-

ner. * * * Next to the objects themselves, I regard variation as the most instructive and important part of the study of conchology."

NOTES.

T. S. Brandegee and Walter E. Bryant, of the California Academy of Sciences, have gone to Lower California intending to make field studies and collections in botany and zoology, with San José del Cabo as their base of operations.

The veteran naturalist, Dr. Edward Palmer, has gone in the interest of the U. S. Agr. Dept. to explore Carmen Island in the Gulf of California, and other places difficult of access about its shores.

PROCEEDINGS OF SOCIETIES.

CALIFORNIA ACADEMY OF SCIENCES. *August 4, 1890.* President Harkness in the chair.

Mrs. R. S. Eigenmann called attention to a shark presented by Capt. T. D. Shid. It is a species seldom found on the Pacific coast of America.

Mr. Walter E. Bryant exhibited skins of several species of *Tamias*, and made a few remarks on their geographical distribution.

Dr. Gustav Eisen gave a highly interesting and alarming description of the destruction and waste of many of the grandest Sequoias, or Big Trees, in certain localities of the Sierra Nevada, pointing out the importance and necessity of immediate action on the part of the California Academy of Sciences in petitioning the Government at Washington to permanently protect these forests.

W. S. Chapman, J. R. Scupham and Gustav Eisen were appointed a Committee to draft resolutions to be immediately presented to the Government.

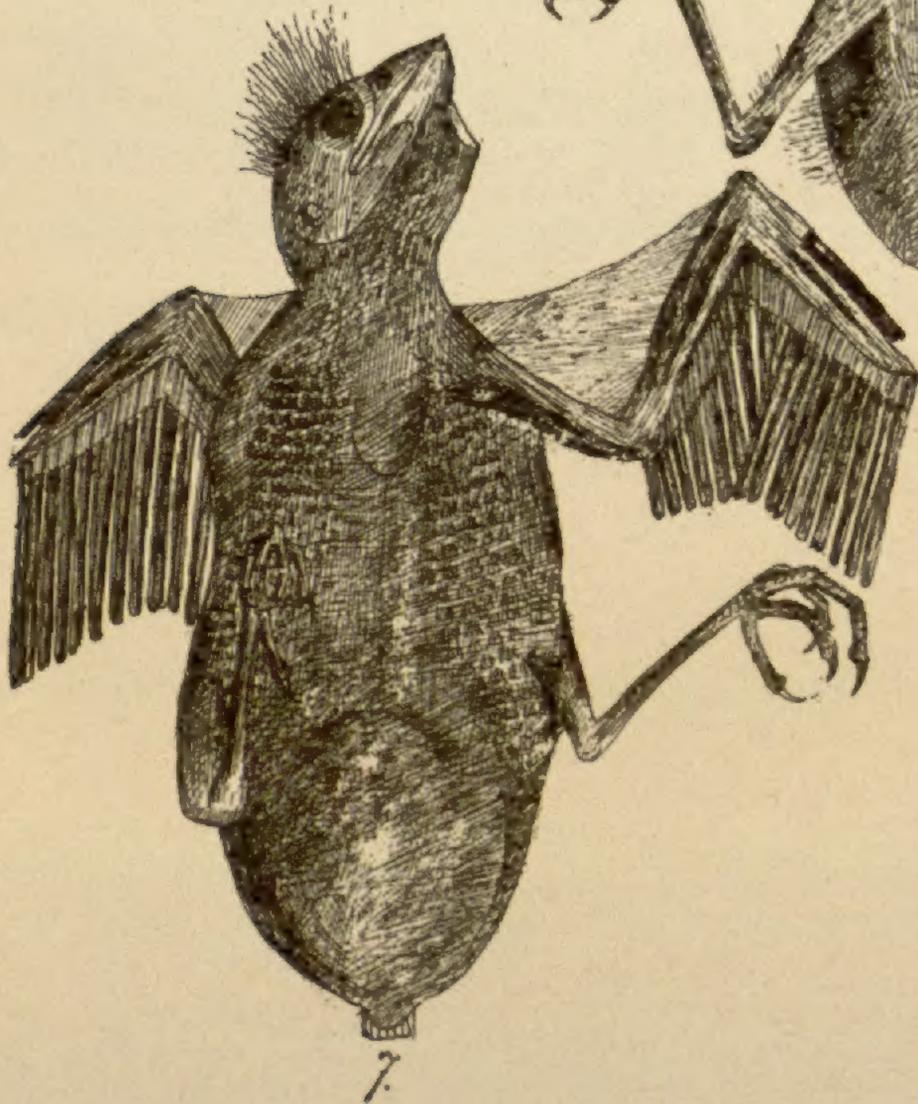
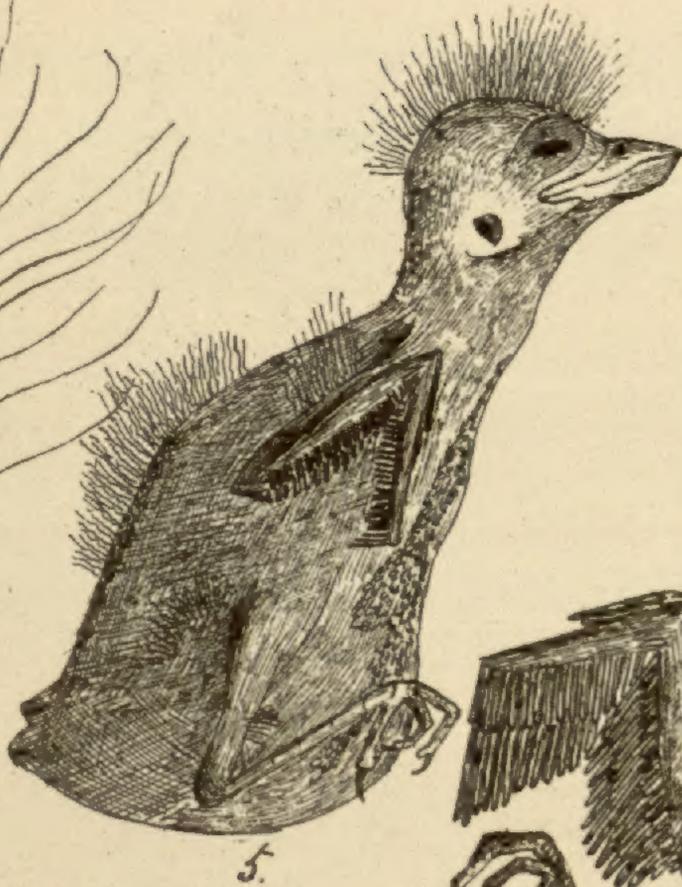
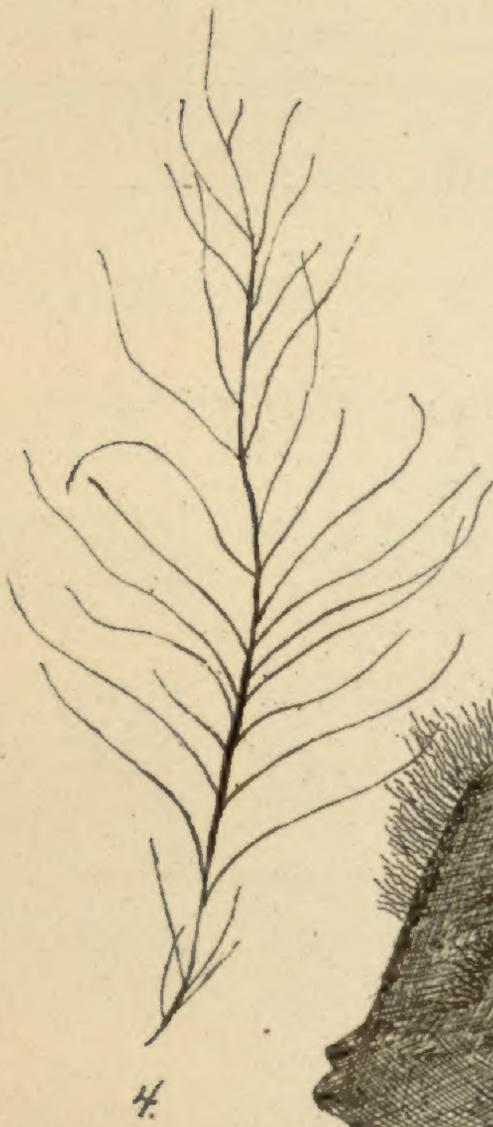
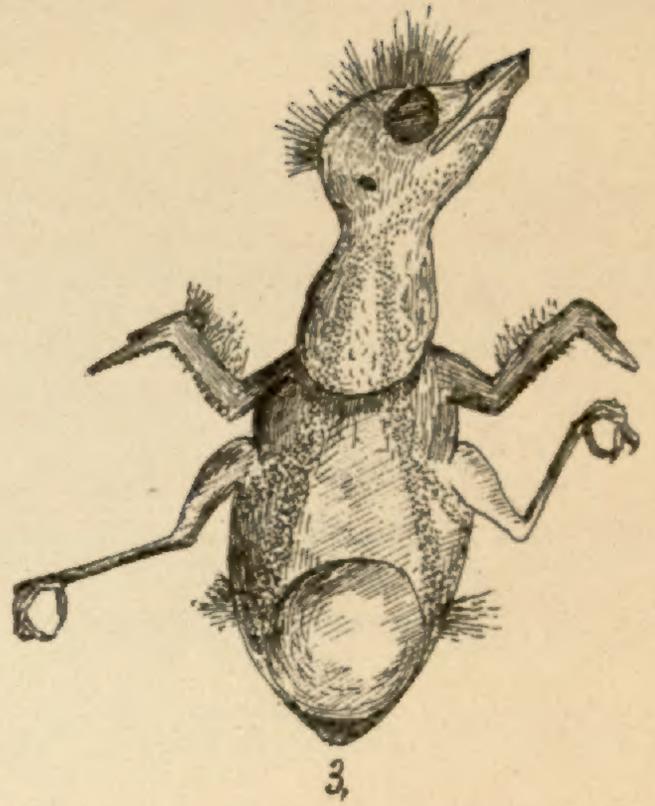
August 18, 1890. President Harkness in the chair.

Mrs. R. S. Eigenmann read a paper urging the establishment of a marine laboratory on the coast of California.

A paper written by Dr. Edward Palmer on the Customs of the Coyotero Apaches, was read.

Dr. Gustav Eisen read the memorial prepared by the Committee on the Preservation of the Big Trees, and it was approved by the Academy.

PLATE VI.



del. nat. C. AK.