

first entomological paper was entitled 'Descriptions of new North American Coleoptera in the cabinet of the Entomological society of Philadelphia' and was published in the Proc. acad. nat. sci. Phila., for 1860, p. 569-571. In the beginning his original work shows unmistakably his inexperience, but his great keenness and a true appreciation of the structural differences that characterize species soon became manifest, and is evident in most of his future publications. Dr. Horn was a rapid, accurate worker, a painstaking and careful delineator. His contributions number more than 150 important papers, in addition to very many minor notes; in these papers about 150 genera and more than 1550 species are defined, and very few

in either series are to be ranked as synonyms.

With but little interest in, and hardly enough appreciation or even toleration for, many lines of study, Horn's monographic work stands with the very best of his time, and though the death of Leconte, in 1883, was considered a calamity to his special branch of science, it may well be doubted if the death of Horn in 1897 is not a greater loss. Leconte left a well-equipped successor in Horn, but the successor of Horn is not yet apparent, and to be worthy of the place must follow closely along the lines so clearly marked out by the well-directed labors of John Lawrence Leconte and George Henry Horn.

## PACIFIC COAST COLLECTING. — I.

BY ALBERT PITTS MORSE, WELLESLEY, MASS.

At the suggestion and with the coöperation of Mr. Samuel H. Scudder of Cambridge, Mass., I undertook last summer a collecting trip to the Pacific Coast of the United States to secure the Orthoptera inhabiting the region between the Sierra Nevada mountains and the sea. At his request I have put together a few notes which may prove of interest to entomologists contemplating a trip to that part of the country.

Of course, so great an extent of territory could be examined but superficially in one summer, but even this had never been done with special reference to the Orthoptera. And although twelve

weeks were devoted to the task it was found impossible to do more than make a cursory examination of the most important points directly on the through line of the railroad, and a few short side-trips to places that promised well. Had it been possible I should have visited several more points situated in less accessible but very interesting localities. The same amount of time could be profitably spent upon a much smaller area. Unless it be necessary to examine, however hastily, a large field the best method is to remain in each locality visited until its various features are adequately covered.

*Route.* My route was as follows: Leaving Boston July 21 an all too brief stay of a few hours in Washington enabled me to secure valuable suggestions from people more or less familiar with the country to be traversed. From thence my route led by way of Atlanta and New Orleans direct to El Paso, Tex., from which point I paid a short visit to Prof. Cockerell at Mesilla, N. M., in the midst of an exceptionally rich and interesting fauna. Returning to El Paso an all-day ride carried me to Yuma, Ariz., which was reached July 4. From this point northward stops were made at relatively short intervals, effort being made for as great a variety of physical and climatic conditions as possible consistent with economy of time and money, from one to three days being spent in a place with side trips when it seemed advisable. Two months were spent in California, the chief points touched being San Bernardino, Los Angeles, San Diego, Yosemite Valley, San Francisco, and Mt. Shasta. Oregon was reached Sept. 6 and several stops made along the line of the railroad and side-trips to Mary's Peak and Hood River. Washington was barely touched at three points, when, the weather becoming unfavorable, I left the coast Sept. 30, returning via the Canadian Pacific railroad.

*Expense.* A three months' trip of this kind from Boston back to Boston may be made, with strict economy, for \$400 — from New York or Washington proportionately less, — not including transportation to and from the Yosemite

Valley, which would be \$25 to \$35 more. An additional \$50 or \$100 will add greatly to the traveler's comfort and the enjoyment of the trip. The expense of a collecting tour of course depends on the amount and character of the territory examined, the time spent at each stopping-place, and the style of living.

The best ticket is the nine months' "Pacific Coast Excursion," allowing sixty days to reach the coast, and nine months for return to point of departure, with privilege of stop-over within these periods anywhere on the route west of certain points. Tickets for side-trips should not be bought till needed, as advantage may often be taken of temporary reductions. Local railroad fares vary from 3 to 6 cents a mile, stage fares from 10 to 45 cents.

In traveling across the continent a berth in a "Tourist" sleeper (second-class) may be had for about one-third the cost of one in the regular first-class Pullman and is fairly comfortable. Meals en route at hotels and in dining-cars average 75 cents each. Rates at the railroad hotels range from \$2 to \$4 a day. In most towns accommodations may be secured for \$1 to \$1.25 a day. In Los Angeles and San Francisco excellent meals may be had for "two bits" (25 c.). Sometimes high-priced houses have a low rate that may be secured on application. If a stop of several days at a central point is contemplated it is usually best to engage a room by the week and take meals where most convenient. At railroad stations where there are no hotels one may

usually secure meals at least at the section-houses, and if blankets are carried may sleep out with comfort almost anywhere. To reach points in unsettled districts it is often necessary to go with an "outfit" consisting of pack and saddle animals. These, with guides, may generally be secured at hotels or livery stables at prices proportionate to the labor involved and the service rendered, ranging from \$1 to \$5 a day for animals and \$2 to \$10 for guides.

*Baggage.* This should consist of, 1st, a trunk to contain extra clothing, blankets when not in use, reserve apparatus, supplies, etc., and at times more or less of the material collected (150 lbs. weight free on railroads, — stages and transfers extra); 2nd, a good-sized gripsack or its equivalent to contain clothing and supplies for immediate use, guide-books, maps, etc., — which is usually carried free anywhere and is all that is necessary for short side-trips; 3rd, a collecting-outfit and packing-boxes ready for instant use, — often of service during stops of the train for water, at sidings, and in breakdowns or delays of any description.

*Weather.* From May 1 to Oct. 1 the weather is very rarely unsuitable for collecting, though near the extreme dates it may be unsettled. On the shore the early morning and late afternoon are quite often foggy. In the mountains showers may occur in any month, but are rare. Rubber wraps and blankets to protect from rain are never carried in summer, but light ones to protect from dust are very desirable,

especially when traveling by team or stage on much-used roads, *e. g.*, to the Yosemite Valley.

*Temperature.* To the northerner the climate of southern California in midsummer is liable to prove trying. Personally I felt no inconvenience until the mercury reached 110° to 115° in the shade. In these circumstances everything, even growing plants and substances otherwise invariably cool, was uncomfortably warm to the touch, and the utmost lassitude and indisposition to effort of any kind were felt. This temperature, however, was experienced for but a few days while in the Colorado Desert, and the lassitude may have been partly due to other causes. At 100° to 105° whole days were spent in the field, tramping about and collecting, and though the sun was trying less discomfort was felt than in the sultry heat of the east at 90°.

In the Yosemite Valley the nights, and especially the early mornings, were cold relatively to the rest of the day, but over most of the district traversed there was less diurnal range of temperature than in the east and much less change from day to day.

*Clothing.* No change in the amount or character of the clothing from that customarily worn in New England was found necessary. Immediately on the shore light-weight woolens were needed. In the interior thinner clothing was more comfortable except at high altitudes. At San Francisco during the latter part of the day and on the ferries a light-weight overcoat was desirable,

owing to the boisterous, fog-laden sea-winds.

The hat to be worn depends largely upon individual preference. The lightest and coolest is the cloth helmet, which is provided with an air-space all about the head, allowing free circulation of air. This does not properly protect the sides of the face and neck, and collapses when wet. A broad-brimmed straw gives more shade and is fairly light but allows less circulation of air about the head and is troublesome to carry when traveling. Cork helmets are durable but undesirably heavy. After wearing a cloth helmet for a week and having it spoiled in a thunder-shower I adopted for steady use the ordinary street hat of the east (straw, — 2½ inch brim) and this notwithstanding the fierce rays of the sun in southern California. This was presentable when traveling, gave sufficient protection from the sun and little resistance to the wind when collecting, was worn throughout the season and is still in good condition. Sunburn was prevented by tying one edge of a handkerchief to the hat-band for a few days. In addition, a soft felt that may be rolled up and put in the pocket was found desirable in the north, in wet weather, and at high altitudes.

Two pairs of shoes are necessary, one for town use and one for tramping. Those for tramping should contain plenty of room for the toes and have thick soles studded with hob-nails, the latter securing greater durability and sureness of footing.

Leggings of stout duck or canvas that buckle closely about the ankle and instep are a valuable addition to the collector's outfit, effectually excluding the dust, protecting the trousers from much wear and the gummy tar-weed, and possibly warding off snake-bite.

*Camping.* California is the ideal land for camping-out owing to the long rainless summer and dry soil. While ordinarily it will be found economical of time and labor to patronize hotels and lodging-houses there are times when camping can be done to advantage and one who fails to seize the opportunity will miss many enjoyable experiences. A pair of heavy blankets is sufficient for any elevation up to snow line; a single one is often sufficient and sometimes none is needed. While wraps of some kind are usually desirable in the early morning hours, I have slept with comfort in the San Joaquin valley under a tree, and at higher levels by the side of a fire, without any.

Fires for cooking, light, and heat are of course necessary, but the utmost care in their management is imperative owing to the tinder-like dryness of all combustible matter. In every case dry leaves and brush must be removed from all about and in the forest one must dig down through the half-rotted humus to the soil itself in order to prevent the fire from spreading out surreptitiously. Care must be used to put the fire entirely out before moving on.

*Canteen.* In the hotter districts it is best to carry a canteen if one expects to be away from water for more than an

hour or two. The quart size army canteen will answer for most occasions but for trips of considerable length a more capacious one is necessary. In all cases it should be covered with thick, durable cloth kept wet in order to cool its contents by evaporation.

*Collecting apparatus.* The collector should start with an abundance of apparatus in the shape of net-frames, nets, cyanide-bottles, etc. At least two net-frames should be carried, and parts especially liable to be broken should be taken in duplicate. Nets are extremely subject to damage owing to the thorny character of much of the vegetation. Pasteboard boxes for packing can be found in quantity in the largest cities only, but used ones (thread, button, knife, etc.) may often be obtained in dry goods and hardware stores. Cotton batting may be found anywhere. Carry cheap envelopes for specimens of plants which it is desirable to determine, and blotting-paper to keep cyanide-bottles dry.

*Preservation of material.* This is a simple matter owing to the dryness of the atmosphere, the chief precaution necessary being to guard effectually against rough handling. The method followed was one I have used for several years on collecting trips in New England, slightly modified to meet the greater risk of breakage during transportation. The material was simply packed between layers of cotton in pasteboard boxes perforated with numerous holes and with very few exceptions came out in excellent condition.

For several days after packing the boxes were exposed freely to the air by placing them in an extra net hung up in a current or tied to the handle of my grip when traveling. Some large-bodied insects, like *Stenopelmatus*, were opened and stuffed, but this is seldom necessary.

*Collecting season of Orthoptera.* While the Orthoptera, like other insects, may be obtained at all seasons of the year, there is with them likewise a period when the number of species and individuals in the adult state is greatest and which is consequently the most advantageous season for collecting. For several orders the early summer months are undoubtedly the most favorable time but to this rule the Orthoptera form a notable exception. In the majority of species the winter is passed in the egg stage, the young appear in spring, grow through the summer, and reach maturity in late summer or early fall. In New England the most favorable time for collecting is from mid-July to mid-September, while for most orders it is in June and July. On the Pacific Coast also this rule holds good: in Washington and Oregon the best period will be found in August and September, in California from July to September according to latitude and elevation. This fact of a later collecting season for Orthoptera than for other orders seems to have been overlooked by several collectors and entomologists who were consulted before setting out. As it proved, I was a little early in the southern and late in

the northern parts of the district examined. There are, of course, species that can be obtained only in the spring.

*Observations on other orders.* To other orders but little attention was paid. The most noticeable in point of numbers were Homoptera and minute Diptera which swarmed at times in thick vegetation and about damp places. Heteroptera and Hymenoptera were occasionally numerous. Several kinds of butterflies, mostly in poor condition, were common in So. Calif., and sometimes favorable localities were found where a few species of Odonata were plentiful. Coleoptera were rather scarce, except occasionally, when certain species were met with in abundance.

*Character of collecting.* In California, while the extreme conditions accessible are greater, ranging from sub-tropical deserts to glacier-crowned peaks, and this sometimes within a strikingly short distance, yet, as a rule, the collector finds it necessary to travel about more than in the east. This is because the country is laid out on a broader plan and there is less variety in each square mile than in Massachusetts, for instance, where one may often visit woods, fields, streams, peat-bogs, sand-hills, and rocky ledges in an hour's ramble. In California a similar variety in so small compass can rarely be found.

At the time of my visit the conditions over most of the regions examined were those of great aridity, and the larger proportion of the Orthoptera secured belonged to a group partial to such

conditions,—the Oedipodinae. Except where recently irrigated or within a few feet of running water, the soil, even in the forests, was absolutely dry. When of adobe it was sun-baked, extremely hard, and rent with cracks penetrating to a depth of several inches or a foot, affording complete safety to insects taking refuge in them unless the collector were armed with pick and shovel.

The grass was parched and brown and the soil exposed everywhere except along streams and irrigation-ditches and in wet grounds, where a tall, dense growth of grasses and allied plants was found. In consequence grass-loving insects were less numerous and much restricted in area. Alfalfa-fields, irrigated, and looking most attractively green, were not as remunerative collecting grounds for Orthoptera as would be expected. In desert regions many species were found on bushes and weeds. The best localities for securing variety of species were those near water, either streams, springs, or artesian wells and tanks; in such places insects of all orders congregated.

*Precautions.* Sunburn of face, neck and hands, which may become very painful and interfere with work, must be guarded against until a coating of tan is acquired. Sunstroke is so rare as to be almost unknown; and if the head is kept wet and care used not to become overheated by violent efforts there is no danger. In the hot regions thirst must be constantly kept in mind in wandering to any distance from houses, as even a few hours exposure without water may

involve suffering and serious consequences. The first question to be asked regarding a journey is in respect to where water may be obtained. Keep the mouth shut during exposure and eat juicy fruits, thus lessening the desire for water. In many places the water is more or less alkaline in character (as may be recognized by a slightly sweetish taste) and acts rather powerfully, but the free use of lime-juice, acid phosphate, or fresh acid fruits neutralizes this tendency. The amount of water and juicy fruit that may be consumed without bad results in the dry atmosphere of the southwest is astonishing. People usually lose flesh rapidly during the first few weeks' exposure.

In the hotter regions, when a considerable distance is to be covered, or when climbing mountains, it is advisable to ride if possible, especially if unaccustomed to physical exertion in hot weather. For climbing, choose the coolest part of the day. Snow-covered mountains should on no account be attempted without a companion, preferably a competent guide, as even a slight accident is likely to be followed by serious results. Carry a compass (a watch-charm is sufficient) and use it when on mountains where clouds are liable to form at any time, and in the forest when leaving the trail. Do not go far from a trail unless familiar with the region or provided with a specially developed bump of locality. When at a distance from supplies abstain from consuming the last of either food or water until more is directly at hand, —

unforeseen emergencies may arise. It is desirable to carry lunch on railway journeys as delays are of frequent occurrence. Before setting out on a trip into wild country get all information possible regarding the route, preferably from several persons. Rely upon statements of no single person unless he is thoroughly familiar with the country. Information regarding points along the railroad may often be obtained from train-men, particularly those on freight-trains.

Footsoreness can be prevented by wearing thick-soled shoes, or by a different method of walking, using other muscles and pressing less upon the ball of the foot. Chafing and blisters can be prevented by the use of hard soap moistened and rubbed upon the inside of the socks where needed. This is especially cooling and grateful to feet unaccustomed to the burning soil of the desert regions.

*Drying out material.* In damp weather and on the sea-coast it may be necessary to dry material by artificial heat. This may be done by hanging the boxes in a net over a lamp or gas-burner. In case mould is feared powdered naphthaline should be sprinkled among the specimens.

*Poisonous animals and plants.* Mosquitoes are rarely troublesome, only on salt-marshes and about standing water, and a mosquito-curtain is seldom needed. House-flies are abundant and extremely persistent. Fleas are only too common but cannot always be caught when desired. Scorpions are

common and should be kept in mind when handling wood for camp-fires, putting on shoes in camp, examining bark of fallen trees, dead leaves, or rubbish of any kind on the ground. They seem to be attracted to fire at night. Their sting, while painful for a few minutes, affects people differently but seldom produces serious results; immediate application of strong ammonia is recommended. Centipedes two to three inches long were common but did not offer to bite. Tarantulas were not met with. Rattlesnakes, while said to be common, are rarely seen; I met but two in all my rambles. There is a small species, about 16 inches long, found on the Colorado Desert and perhaps elsewhere, called the side-winder, that is more active and quite as deadly as the larger kind, and is generally feared in consequence. One should be cautious when inspecting low bushes and weeds in the desert regions, and should be prepared to treat snake-bite if so unfortunate as to be wounded.

“Poison oak” or ivy (*Rhus*) is very plentiful in certain sections and contact with it should be avoided. Immediate washing after exposure is said to lessen the danger of bad results. In case of poisoning apply a solution of hyposulphite of soda (photographer’s “hypo”) or weak carbolic acid. Nettles and cacti are also to be shunned.

*Preparation.* In preparation for

such a trip the intending visitor will find it advantageous to study the topography\* of the Pacific Coast states; also, to examine the biologic map of North America published by Dr. Merriam in *North American Fauna* No. 3, the climatic map of California published by the So. Pac. R. R., and the articles on geographical distribution in North America by Dr. Merriam in the *Dept. of Agriculture Year-book* for 1894 and *North American Fauna* No. 3.

For a guide-book Baedeker’s *United States* should be purchased,—this is indispensable. Railroad maps, folders, and illustrated booklets (some of which are very helpful) relating to the Pacific Coast and the routes thereto may be procured from agents of the various transcontinental lines. In addition get Rand, McNally & Co.’s vest-pocket maps of the various States (15c. each,—best thing out for railroad stations and general use). For details of topography there is nothing so good as the few sheets of the topographical map of the United States, published by the U. S. Geol. Survey. These cost but 5c. each and may be had of the Director, at Washington. A knowledge of the right time to go and places to visit can best be secured from one’s fellow-specialists. The appended notes on localities may be helpful.

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\* See “Topography of California” by N. F. Drake, in *Journal of Geology*, Sept.-Oct., 1897.



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