he overlooked publishing his comparison of the Batopilas series of cotypes, but he erred because he failed to realize that the purport of his paper might be twisted into a mere attempt to prepare a safe bed for a new race and believed the synonymic identity of *sonorensis* and *ruberrimus* had been proved. The criterion of the true scientific approach is an ardor for all the facts, not merely a zest for nomenclatural niceties, which easily can be overemphasized to conceal really important problems of distribution. The criterion of the "approach" of this criticism is its author's failure to examine a single one of the thirty-three specimens (Moore Collection) of *rhodopnus* and on this failure to obtain essential facts rests his "emphatic opinion" that *"sonoriensis* will easily include *rhodopnus"!* I am heartily in accord with the claim that the matter is still "open" for a reviewer. Certainly the status of *sonoriensis* is not a simple problem, as it involves discontinuous distribution. I do not believe the final decision one way or the other will affect the validity of *rhodopnus*.

California Institute of Technology, Pasadena, California, July 15, 1937.

THE SWALLOWS AT THE LIFE SCIENCES BUILDING

By JOSEPH GRINNELL

Our campus list of birds has from the start included the Cliff Swallow (*Petrochelidon albifrons*), even though whole years have passed without report of even one individual of this species within our area. Back in 1909, and maybe previously, there was a nesting colony on an old barn up Strawberry Canyon; but with the wrecking of that building there could be no return of the swallows there. Also, from time to time, nesting groups of cliff swallows have been seen or reported on buildings within or close to the city limits of Berkeley.

The Life Sciences Building was carried through to completion in the year 1929; but not until 1935 was any notice of its presence taken by any swallow, to my knowledge. In that year, on or about June 1 (note the lateness of the date) cliff swallows first appeared about this building, and at once they began nesting activities. On June 23, I saw several nearly or quite completed nests in the little niches of the walls, high up, at the southeast and southwest corners of the building. On that date I judged there were about 20 pairs of the birds about, all told. The nests were much scattered, and some of them may not have been completed, or at least not occupied to the stage of bringing off broods.

The point I make here is that in 1935, a small group first selected our cement walls, which are cliffs to them. I might speculate that this initial group was comprised of yearling individuals that had tried to nest elsewhere earlier the same season and met with disaster.

It was in 1936 that the story of the Life Sciences swallows developed in truly interesting manner. On April 16, I saw my first birds, at the southeast corner of the building, and other campus bird-watchers reported having seen them a day or two previously. There were at the outset but few. My next notebook entry is dated April 25; then "at least a dozen" cliff swallows were actively constructing nests, wet mud in evidence, at the southeast corner of the building above the main entrance. The sites chosen were all in the duplicated squarish niches in the frieze or molding that extends almost continuously clear around the building. Note that this structural pattern is repeated on all four sides of the building, but that the first-arriving swallows chose the south side of the building, at the east end of that side.

After that date more and more swallows came. By May 12, when at 7:45 to 8:15 a.m. I made a count of the nests, I found that 128 pairs of the birds were present and established. The nests then varied all the way from the merest lower rim of wet mud to complete retorts. The most populous place was above the southeast entrance of the building, where most of the 48 nests there, were already completed.

In recording my census of nests, I made a diagrammatic plat of the building and entered the counts graphically. Dividing this diagram into four sectors, I found that the nests were clustered about three out of the four corners of the building. On the originally colonized southeast sector, there were 89 nests; on the southwest sector, 24; on the northeast sector, 15; but on the northwest sector, not a trace of a nest.

Of the 128 nests, all but 6 occupied sites in the rectangular niches of the frieze before mentioned—which is at the level, about, of the fifth floor of the building. The exceptional six were on irregularities of the cement wall, two of them above and four below, the level of the frieze. All of these off-level nests were in the southeast sector.

My next observations were on June 4, when a similar count taken showed the presence of 161 pairs of the birds, as represented each by a nest. It was notable that as compared with the census of May 12, all of the new sites had been chosen on the south face of the building. There were 52± of these new ones, the number indefinite because even at this date there were many mere rims. However, to anticipate, many of these rims were never carried forward to completion, as was also the case with some of those counted on May 15.

By this date, June 4, many nests had long been completed, and those in the metropolis, above the entrance to the building at the southeast corner, already, as presently to be evidenced, contained young. The frieze about the southeast entrance to the building was so much preferred over the seemingly identical sites elsewhere that every single one of the niches was occupied by a nest; indeed, two nests were crowded onto space immediately below the row of niches, and three or four, as previously indicated, on irregularities on the cement surface above.

Now a new factor of interest to us, and of serious import to the swallows, came into the picture. On May 27, I first became aware of the presence of English Sparrows (*Passer domesticus*). At the southeast corner of the building I saw males of this aggressive species behaving as if evicting cliff swallows from the latter's nests. Male sparrows, calling loudly, were either perched on the coping under the nests or were actually ensconced within the entrances to the swallows' nests. Furthermore, on the southeast steps at 1 p.m. of May 27, I found remains of eggs. On May 30, at 1 p.m., in the same location, I saw on the steps two dead young swallows of about hatching age, a splashed, incubated egg, and many fragments of eggshells—the latter definitely of the swallows because of the umber spotting on the shell fragments. Directly above, along the row of 48 swallows' nests, were several male English Sparrows. I did not see a sparrow actually pitch out a swallow's egg or young, but the evidence, though circumstantial, that they were doing so seemed to me at the time to be conclusive.

When I made the census of swallows' nests on June 4, I counted 11 English Sparrows, 7 of which were males perched on the coping near swallows' nests from which protruded wisps of nesting material; the birds were singing, if English Sparrows can be said to sing, as though sitting females were inside certain of the nests. Again and again, a sparrow was seen to enter a swallow's nest; but I did not see a swallow and a sparrow enter the same nest. On the southeast steps, I saw more, dead, naked, seemingly just hatched swallows, and also two more splashed eggs. The same sort of observations were made on June 5 and 6. On the latter date, sparrows were seen carrying

nesting material into swallows' nests at the southwest corner of LSB, so that all of the three corners of the building patronized by the swallows had also attracted sparrows.

By June 12, young cliff swallows began to be noted abroad. A nestling reported to be able to fly had been picked up from the ground north of LSB as early as June 2. The minimum interval for reaching this stage from the date of first arrival of the swallows was thus 48 days.

On June 26, 6:45 to 7:30 a.m., I again took count, both of swallows and sparrows. By that date, at most, a net number of 95 pairs of swallows were thought to have been successful; at least there were then 95 completed nests not occupied by sparrows. Additionally, many swallows' nests, most of those on the middle south side of the building, between the southeast and southwest entrances, had never been completed. Fifteen of the completed swallows' nests were on this date occupied by sparrows. A clue to successful occupancy of any nest by the swallows was afforded by the conspicuous whiteness of the rim of the bottleneck. This rim of whitewash, that is, excrement, indicated occupancy of the nest for some time by young swallows.

By this date, June 26, many young (I judged 45) were out of the nests, flying about or clinging along little ledges on the east and southeast faces of the cement walls, almost always in direct sunshine. The young swallows were being fed by old birds, either when the former were perched or when they were on the wing. Young were seen in some of the nest entrances, looking out. Then the silky whiteness of the throat, a color mark characterizing only the juvenal stage of plumage in this species, shone forth conspicuously against the blackness of the shadowed interior of the retorts, especially so where these were ensconced, as most were, in the deep recesses of the frieze. Possibly this white marking is an advertising or a directing device, facilitating quick and accurately aimed delivery of food to the young by the parents. The white-appearing brow-patch characterizes only the adults.

At this time, it was noted that some of the nests longest preëmpted by the sparrows had the bottle-neck broken out, with result that much of the dry grass and feathers accumulated inside by the sparrows protruded. At this date, June 26, I saw the first young English Sparrows out of the nests; adult sparrows were going to and from their nests or young along a south or southwesterly course, high above the lawns, as if patronizing a forage beat far beyond campus confines, in business sections of the city.

I was amazed at the aggregate large numbers of the English Sparrows around LSB, where before 1936 I could not recall ever having seen any, since its construction, in the summer time. Again we have illustrated how the fortunes of one kind of animal may be influenced favorably by some circumstance in the economy of another. The swallows, by furnishing appropriate nest sites, brought the sparrows into a territory new for them. Partial supplantation, or succession, was in evidence.

On June 28, at 2:15 p.m., at one moment, I counted 29 young cliff swallows clinging in the countersunk letters of the word "bacteriology" at the southeast corner of LSB. Then, a certain nasal note from adult swallows in flight out in front of the wall, sent these and other young in the vicinity simultaneously off into a swirling flight southward over the lawns, some of them out of sight over the town, presently to return—practice flights, I guessed.

On July 4, at 1 p.m., I counted 105± young swallows clinging to ledges or perched in recesses of the two walls of the building at the southeast corner. All were toward the top above the level of the frieze harboring the nests. All but a very few of the successful nests had now yielded their broods; and there was notably less litter on the steps beneath the main mass of nests—which steps had been swept and hosed by the janitors at least weekly.

By July 10, practically all of the young swallows had swarmed entirely off the campus; and but a very few adults remained. Possibly 10 pairs were still visiting nests on July 20, at the southeast corner, and 2 pairs at the southwest corner of the building. On July 23, fully a dozen young swallows, possibly of second broods though more likely of late-nestings, of retarded pairs, were seen out and clinging along ledges above the level of the nests. On July 26, a circuit of the building at 9:20 a.m. showed not a swallow in sight or sound in any direction. No excrement or litter, either, was detected on the regularly swept steps at the three swallow-occupied corners of the building. There were still a few English Sparrows about. I concluded that this season's chapter of the story of the swallows was closed.

But on July 29, I saw two to four adult swallows visiting nests elsewhere than directly above the entrance steps, though in niches that were near by. On August 4 I saw one adult. On August 10 I saw two adults flying about the southeast corner—not attentive to any one nest. And that was my last date for any swallow whatsoever. No young had been seen since July 26.

The total period of presence of Cliff Swallows at the Life Sciences Building, April 16 to August 10, was 117 days, close to one-third of a year. But the greatest numbers of the birds were present only from about May 1 to July 10, 71 days or but one-fifth of a year. In that space of time, nests were built, eggs incubated, and young launched.

Although at least 161 pairs of swallows essayed to nest on LSB, for various reasons only about 95 pairs succeeded in bringing off broods. Figures as to numbers in broods are entirely lacking; but judging from numbers of young abroad at launching times I estimate the total production of full-grown young in the year 1936 at about 190, or 2 per pair of adults, or 100 per cent net ratio of reproduction.

One of the questions brought up by this narrative is suggested by the directional "exposure" chosen by the swallows on this perfectly symmetrical building. This selected exposure is *southeast*ward; it was that exposure that was chosen by most of the few firstcomers, in 1935, and the same exposure marked the greatest concentration of nests in 1936. While the northeast and southwest segments of the building supported also a few nests, the opposite, *northwest* segment has not, to my knowledge even been "prospected" for a nest site by any pair of swallows. Yet structural conditions on all sides of the building would appear to the human eye identical.

As to the determining factors for predominant southeast choice, I can only speculate. They may have to do with warmth in the early part of the day when, my impression is, most of the nest-building is done. Quick-drying, and hence more certain adhesion, of the mud may be favored on the exposure toward the warm morning sun. Then, the light-factor may figure; *if* the diurnally-adapted swallows do most of their nest-building in the forenoon, that would mean better views of the work in progress in the shaded niches, and within the growing mud-walled retorts themselves; also, the openings of the nest entrances in direction toward the brightest segment of the sky may be most favorable during the period when young in the nest are being fed.

Direction toward main source of mud during the nest-building or, rather, nest-starting period *might* be a factor, as also a direction toward more or less distant daily forage areas. But I am unable to offer any observations of positive bearing on these theories. That the swallows arrive in the spring *from the southeast,* presumably, and hence first inspect potential nest-sites from that aspect suggests another hypothesis—but this idea seems pretty tenuous!

So, let us keep watch of the swallows at the Life Sciences Building, keeping record of the history of this newly established colony. How long will it prosper? Here we have a total of close to 1500 linear feet (over a quarter of a mile) of nearly uniform cliff-face,

part of which has proved itself adapted to these birds' nesting needs. There is no immediate dearth of space, even if already used surface be not so good for attachment of new nests. Barring human-caused catastrophe, what will be the course of events?

Thinking back through the years, depending upon memory to be sure, because of my failure to make written record of detailed observations in this particular matter, I cannot recall any relatively permanent cliff swallow colony, either on rock surfaces or on buildings. Colonies have come and gone. Two or three years of occupancy of any one exact site has seemed to be the limit. In each instance, favorableness of any given site was outlived and the "rancheria" transferred to some new site.

Is the factor for this periodic limitation of colony site something having to do with nest construction—like deterioration of surface? Or has it to do with accumulation of invertebrate parasites about the nests? Or has it to do with increasing predation upon the swallows, young and old, by other birds, past a point of racial endurance? Or has it to do with exhaustion of vitally necessary food elements within the cruising radius of the foraging swallows? Or, finally, may it not be an intrinsic factor, in that young of each succeeding generation are led inherently to establishment of new, separate nesting sites, with the result that each colony site is occupied only as long as the lifetime of a generation of swallows?

I am tempted here to think of other colonial animals. Are not all or most of such, limited in their length of tenure of any one spot of ground? Prairie dog towns wax and wane; but ever, new ones spring up on new sites. Exhaustion of resources, or contamination of habitation, causes progressive shifting. In human history, the phenomenon is common; cities rise and fall, their sites presently to be marked only by fragments of bricks. And maybe the fundamental ecologic factors are pretty much the same as in the "Republican Swallows," as they were called by Audubon in 1824, whose former village sites are to be ascertained only by looking for traces of the little mud "bricks".

If someone in temporal authority, stimulated by a zealous impulse to preserve formality and tidiness on the campus, be not led to drastic action *un*favorable to the continuance of this present experiment in nature, we bird-watchers will have opportunity to see happen significant things for the understanding of cliff swallow natural history.

Museum of Vertebrate Zoology, Berkeley, California, March 17, 1937.

BIRD LIFE AT TWENTYNINE PALMS

WITH THREE ILLUSTRATIONS

By FRANCES CARTER

An oasis providing abundant water and shade in the midst of a vast arid region is an ideal place for observing bird life. Such is the oasis at Twentynine Palms, San Bernardino County, California. It is situated within the southern border of the Mohave Desert at an elevation of 2100 feet, about 50 miles northeast of Palm Springs, and 60 miles from Banning, Riverside County. The community, which takes its name from an historic group of Washingtonia palms, is widely scattered over a broad valley, surrounded by the Little San Bernardino, Pinto, Sheep Hole, and Bullion mountains. In recent years, its popularity as a resort has led to rapid development, and certain areas are now thickly settled.

The narrow strip of oasis, running along the southern side of the valley for about three-quarters of a mile, is interrupted near its center to form two distinct parts. The