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THE AMERICAN PIPIT IN ITS ARCTIC-ALPINE HOME

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Plates 1-4

IN the lowlands of California the American Pipit (*Anthus spinoletta rubescens*) is commonly observed as a wintering bird. Its mild *peep-eeep* can be heard very frequently, even over cities. Its tail-bobbing, walking gait can be seen on nearly all plowed or vegetation-barren fields and around all borders of water and the margin of the sea. This wagtail is a common wintering bird. It does not leave its winter home until the last of April, but by that time it will have departed completely, and no more "peeping" and tail-wagging birds can be observed until September again returns.

That this bird nests in arctic conditions has been well known. Since true arctics were entirely too far to the north for me to visit, however, the Arctic-Alpine Zone of a high northwestern mountain was substituted. Pipits beginning their nesting activities and hunting nest sites, and battles between males were observed on July 5 on an "island" in Edith Creek amphitheater of Mt. Rainier, at an elevation of 6,000 feet in a region of extensive snows. A great deal was learned about the nesting activities of the species, but there still remains this problem: What did the pipits do between the last of April and the first week of July, a period of more than two months? Why was so extensive a time required to reach the breeding site?

The "island" mentioned was merely a shallow protrusion through the extensive snow fields. On the date mentioned a female pipit was flipping about this "island," showing the activities that accompany nest-site selection. At the same time, in her vicinity, two males were battling violently. One of the males was on the near-by snow. The other male plunged down from above with a determination rarely to be observed in any avian battles. This battle between the male



AMERICAN PIPIT (*Upper*) EDITH CREEK AMPHITHEATER ON MT. RANIER, WASHINGTON. NEST IS IN FRONT OF BLIND ON LOWER LEFT. (*Lower*) PIPIT NEST UNDER MARGIN OF BOULDER IN THE EDITH CREEK CIRQUE.

pipits was unlike any such struggle I have observed in extensive studies of the horned larks. These pipits fought on the ground as well as in the air. One stayed largely on the snow while the other dashed upon him from above and there was no denying the seriousness of their struggles. I had never seen larks fight so desperately or so lengthily. That these were territory struggles and that nesting was just beginning was later learned.

Pipits were heard to sing this day in a wonderful exhibition, surpassing horned larks. They sang in a setting that for magnificence and grandeur has no superior. Pipits were noted at two places in Edith Creek amphitheater and also upon Timber-line Ridge at an elevation of 6,400 feet. Extensive observations showed no nests.

Fogs kept the observers in their tent on July 6, but on July 7 extensive areas of the amphitheater and surrounding elevations were closely observed and only one singing bird was discovered. This was near Panorama Point at an elevation of 6,500 feet. This singing pipit was chased about for a long period, and sang frequently as he was driven from one point to the other. This chase involved steep slopes, deep snow, and rock slides that would try the best climber and beside which the staking of a lark's territory is child's play. The total territory of this pipit was amazingly large—several hundred yards in diameter. This territory was, of course, largely snow but included rock piles and slides and some small meadows of heather and grass. The blossoms that had appeared at this time were yellow and white avalanche lilies, potentilla, and western anemone. No nest, however, was discovered.

A second singing male was observed on the switchback of the trail that led from the amphitheater to Timber-line Ridge, and though this male presented a territory even larger than that of the first male, again no nest was noted. At the end of the day, on the return to camp, a moment was taken to observe the little "island" on which the female and the battling males had been seen on July 5. Almost inadvertently the margin beneath the edge of a small boulder on this island was examined and here was a nest, entirely new.

On July 8, the nest was again visited. The pipit was on the nest, flushed when disturbed, and bounced about, calling, with many evidences of solicitude. In the nest there was one egg. The male, however, was not noted. On this date a pair of pipits was noted to the northward of the Edith Creek amphitheater and also one bird singing on a meadow along Nisqually Glacier. The total number of pipit males certainly noted in the vicinity was now five, extending

from Nisqually Glacier to Panorama Point, from Panorama Point to Paradise Glacier, south to Sluiskin Falls, and west to Paradise Camp.

On July 10, the pipit nest contained three eggs, and though there was no pipit on the nest "island," one was heard singing to the right. The pair of pipits to which the nest belonged was observed about one hundred yards east of the nest. The male sang considerably from an "island," but the female occupied herself by feeding over the snow at fifty to one hundred feet from the male. Notes of the song (at a distance) seemed to be two: *whit, whit, whit* and *cheet, cheet, cheet*.

On this date, extensive observations were made of the song of the pipit. The bird that occupied a territory on the switchback descended from a song in the sky and alighted on the top of an Alpine fir. The beginning of the song seemed to be a *tweet, tweet, tweet*, given in recitative as the pipit climbed high in the sky. It may also be a *chuweet*—a tinkling note. The song usually accelerated rapidly as the pipit set its wings and glided downward. Wings beat steadily on the upward climb.

On July 11, the pipit nest had four eggs and the bird was on the nest at this time. She left only after the observer was within ten feet. Shortly afterward, however, she began to call—a *peet*. She bounced about within thirty to fifty feet as she had done before. The male was on an "island" just to the eastward, where he was calling and singing. The female responded to his notes with a *cheet-eet-eet* or *cheet-it-it*.

On this date a blind was built of snow, the camera was focused on the nest, and a string attached from the camera to the blind. The pipit worked about the nest for an hour or more, occasionally hopping upon a rock. Although she did this several times this day, she did not repeat it more than once or twice during the entire subsequent period in which she was watched. She finally seemed to lose her concern and stood by, preening her feathers and making no attempt to reach the nest. When the nest was revisited about 6:30 p. m., the female flushed off it and behaved as before.

This day a survey was completed of all the territory likely to be occupied by pipits between Nisqually Canyon and Stevens Glacier. This territory, mostly between elevations of 5,500 and 6,500 feet, consists of small meadows and sparse rock fields with vegetation, and large snow fields. Rims of alpine firs with a little mountain hemlock, presenting Hudsonian conditions, occur frequently above the amphitheater which is lower but nevertheless true Arctic. This

region is truly Arctic because at this date it was still largely snow-covered, while the rims had been bare for some time. These tree-embossed rims encircle old glacial cirques of this region. These cirques or amphitheatres catch more snow than the rims and hence, though lower, have Arctic characteristics in contrast to the Hudsonian of the rims. Because of this condition, pipits nest lower than one would expect to find them. The entire Edith Creek amphitheater or cirque is a semicircle two miles east and west, and about one-half mile north and south.

In this region there were some eight singing males. This great spacing and sparse settling of the pipits was due to the small amount of breeding territory, i. e., sparse vegetation-covered meadows with scattered rocks. Bare rock slides and moraines were numerous and meadows and slopes of comparatively heavy heather were here and there, but these apparently would not do. Of course, snow and ice still covered three-fourths of the area.

On July 12, the pipit was incubating, and three views from the snow blind were secured of her on the nest or approaching the eggs. While the photography was in progress, the female would go onto the nest and almost immediately hop off. Finally she left the vicinity.

On July 13 a new blind was made by digging a hole and setting boards about it to conceal the camera and photographer. This task occupied about an hour during which the pipit was on the "island" for the most part, proclaiming her solicitude by mild notes. She accepted this new blind almost immediately and seemed to give it no especial attention at any time. The lens of the camera, however, which was close to the nest, bothered her a great deal. She would approach within six inches of the nest, cock up her head, notice the camera lens, and rush away, once or twice actually flying away. During many of these approaches she was photographed, but when the photographer waited for her to go onto the nest, he was obliged to watch her come up to it, look at the camera lens, and retreat at least fifteen times before she finally went onto it. That the lens was the troublesome factor was proved by the fact that she showed no fear of the camera except when in view of the lens. She frequently walked within a few inches of the tripod.

In addition to the timidity of the pipit in the early photography, there was the fact that this bird was a wagtail, and as such she presented another big problem in photography, namely, that the tail was almost constantly in motion. This was so troublesome a problem that, although two or three good pictures were secured, the bird

appeared to have no tail because it had been flicked at the moment of exposure.

The male sang frequently in the vicinity throughout this morning of July 13, but never actually visited the nest "island." He most frequently occupied the "island" just to the eastward. That the female was aware of his presence was shown by her notes at the beginning of his songs. She nearly always responded by a staccato *cheep-eeep-eeep-eeep* or *chit-it-it-it-it*. That the male heard these notes was evidenced by a frequent acceleration of his song notes when she called.

In spite of the timidity of the female pipit in approaching the nest, she never missed a chance to chase and capture insects that were near. These she would secure with a decided run, twisting or doubling as the case might demand. Great swarms of small stone-flies were emerging from Edith Creek wherever the snow had uncovered this stream a trifle. These flies were very small and attenuated, about half an inch in length and seemed to be very active, even on the snow.

The pipit nest was approached about 10:45 a. m. on July 14. The pipit left when the observer was within twenty feet, flying off and alighting within fifty feet. She made no sound as she left but uttered a mild *peep* as she alighted. The camera was set up and photography attempted until 1:00 p. m. Five exposures were secured of the pipit, two of her approaching the nest and two on the nest, with one of her just leaving the nest. She approached with her usual timidity, cocking her eye at the camera lens as before, but she reached the nest time after time and retreated without going onto it. Several times she entered the nest depression only to fly off almost immediately. This she did at least three times in rapid succession. Having once settled over the eggs, however, she left with reluctance and no amount of noise, banging, and cloth-shaking would then cause her to flush. Only when the photographer stood up, left the blind, and walked within six feet of the nest did she leave. After each flushing she stayed away from the vicinity for several minutes before again approaching the nest. As on a previous day, she would also be distracted from nest-approach by the presence of an insect after which she rushed with alacrity.

She had a procedure in connection with nest protection which, however, was not elaborately developed. It consisted of leaving the nest in weak concealment, in approaching again with reluctance, and sitting tightly after too prompt a re-flushing. Once she was fully settled on the nest she became completely motionless in spite of

her restlessness, constant teetering, and extensive activity of the previous moment.

The female, in answering the male in song, has several cries or sputters: *tlip, ip, ip, ip, ip, ip, ip, ip* or *pip, pip, pip, pip, pip, pip, pip, pip, pip*. This is the type of sputter made by all pipits as they take off in flight. The male sang most consistently from the "island" east of the nest or from its general vicinity. Only once did he visit the nest "island" and then when chasing another male. All three birds (two males and the female) were in this chase. Whether the male and female were chasing the stranger or the stranger chasing the female with the mate after both, cannot be said.

A second male occasionally sang from the lower amphitheater. Just where his territory was could not be determined. On a second journey through the amphitheater late in the afternoon, the following notes regarding song were made from the efforts of the male that sang most persistently from the switchback region. The usual note was *churee* (which at a distance might sound like *taree* or, when rapid, merely *tree*). This note was uttered between two and four times per second, about two times per second on a long upward climb, or as much as four times per second on the descent. Frequently the rate was three per second.

The pipit usually sang throughout the full flight; often, also, before starting and frequently after alighting. The length of the flight varied from a few feet to several hundred yards, from almost no elevation to at least four or five hundred feet. The bird may ascend almost vertically and alight almost at the taking-off position, or it may describe a huge parabola and alight several hundred yards away. It rises by a steady wing beat at a very steep angle (not closed), pitching from side to side in a tumultuous and dizzy zigzag. Over the snow, the light from beneath is reflected from the ascending bird, usually making the position of the songster easily ascertained (if one's eyes are not already snow-blinded).

Now and then the *churee* note is reversed, thus: *reechu*, giving a totally different effect in the song. The *reechu* is less frequent than the *churee* but is interpolated often in the song. Occasionally the bird stops its singing suddenly while in flight and may make no further utterance or it may start with a different note after complete silence (though only of a second or two), giving the effect of suddenly stopping a phonograph and as suddenly changing the record.

When notes are given at their maximum they may sound, especially at a little distance, like *cit-, chit, chit, chit*, etc. Of two flight

songs of the switchback male that were timed, one lasted for forty seconds and another for a full minute. During the period of half an hour that this male was under observation, he sang many times. The tinkle of the song was very pronounced.

On July 15, the pipit nest was visited at 12:30 p. m. and left at 2:15 p. m. During the period the nest was under observation, six photographs were taken. The female went onto the nest quickly and readily, much more readily than at any preceding time. Only once did she rush off the nest after entering it. She made very few of the preliminary sallies that had been her custom hitherto. She would allow the photographer to approach within six feet before she flushed, and then usually went only ten to fifteen feet. Her only note was a mild *peep*, and she answered the male's notes only once. She left at twenty feet when first approached and alighted thirty feet away. She caught several insects near the nest as she moved about, and entered the nest at fifteen feet as the camera was taken down.

Whether the change of attitude of the female may be attributed to accrument of the incubation instinct or to acquired loss of timidity cannot be said. The former interpretation is probably correct since the invariable response of bird instincts is known.

Between July 15 and July 17, the hundred-mile journey was taken that was necessary to reach the northeastern side of Mt. Rainier. Camp was made on July 17 at the White River Camp at an elevation of 4,400 feet. To reach the interpass between Burroughs and Fremont mountains, a two-thousand-foot, two-mile climb was necessary first to reach Yakima Park and then to make the climb of several hundred additional feet past the very beautiful little glacial tarn called Frozen Lake. Several ascents were made to Yakima Park and to the pipits at the Burroughs-Fremont Mountain interpass.

In the region of Frozen Lake, on the meadow that lies between Burroughs and Fremont mountains, two pipit nests were found—one by the photographer and one by a companion. One nest contained young not over two days old, perhaps younger. It was in a beautiful setting of yellow heather, a pure index form of the Arctic-Alpine home. This nest contained six young. The female was brooding and left her young only when the nest was closely approached. The other nest, with four eggs, was under leaves of the purple aster. The incubating pipit left the eggs when the observers were within a few feet. These nests were found on July 17, at an elevation of 6,500 feet. On this date male pipits were in full song.

On July 18, the day was spent in camp, concerned chiefly with

cataloging developed negatives. On July 19, a trip was made over Burroughs Mountain, and although a pipit voice was heard, the fog was so dense that observations were severely restricted.

The two known pipit nests were visited at 1:30 p. m. on July 21. On this date only two songs were heard up to 6:10 p. m. Although the incubating bird was not seen to leave her nest, the four eggs were warm. Upon the observer's return to that region at 5:00 p. m., she sat until he was within four or five feet and then went without a sound, flying fully a hundred feet before alighting. In the nest occupied by the young pipits, five were still within the nest, but one was outside, dead. The young, with their eyes opening, responded to any sharp call or cry if sufficient intervals were allowed to elapse between the calls. At this time the young had a faint "peeping" note. It had been learned that the eyes of the Prairie Horned Lark open on the fourth day following hatching. The pipits were, in their behavior, so much like the horned larks that their ages perhaps could be similarly computed.

At this time a hole was dug near the nest, over which a roof was made of the alpine firs from the fir mats on Fremont Mountain. The pipit did not come near in spite of a two-and-a-half-hour wait. She stayed in the vicinity, "peeping" softly the while. At times two pipits were near.

The down of the young pipits was of a lead or blue-gray color, scanty, and restricted to the head and occiput, a strip down the center of the back, the secondaries and their coverts (not primaries), and very little on the thighs.

The evidence at each of these pipit nests was that the cavities had been dug by the adult, for little mounds of fresh soil extended out from the nests. The ground there was especially soft and mellow.

Yellow heather predominated over the nest that held the young, but a little Lyall's lupine (*Lupinus lyallii*) and a plant of potentilla with a purple aster surmounted it. The small mound under the edge of which the nest was placed was beside a small run-off in a gentle slope, with little lateral connections. This drainage accounted for the existence of the mound.

This region is a divide between two drainages and is also a rather wide valley between the two elevations of Burroughs and Fremont mountains. It is comparatively level, has rocks in pavement beds (talus plates, chiefly, with some small boulders) here and there, with rather extensive areas rock-free. There were no rocks in the immediate vicinity of the heather nest, for instance, but the other nest was built in a small rock slide.



AMERICAN PIPIT: (*Upper*) WITH AN INSECT FOR THE NESTLINGS; BURROUGHS-FREMONT MOUNTAIN INTERPASS. (*Lower*) FULLY FLEDGED NESTLINGS SLEEPING IN THE SUN.



AMERICAN PIPIT: (*Upper*) APPROACHING NEST IN EDITH CREEK CIRQUE.
(*Lower*) INCUBATING.

There is one copse of alpine firs with a single white-bark pine in a small mat on the west edge of this region, and another single fir. Otherwise the region has no trees, though fir mats ascend Fremont Ridge to a height of five hundred feet above this region on a south-facing slope. There are no trees on the talus slopes of Burroughs Mountain which bounds the region on the south, but this is because it is a north-facing slope.

The meadow had much mountain phlox in mats that, here, had largely ceased to bloom (though in full bloom 500 feet higher); an everlasting that was a predominant plant, though only two or three inches high; large quantities of yellow heather, especially on the west slope, in places completely covering the ground but nowhere more than a few inches high; a yellow composite three to six inches high; Lyall's lupine here and there; a species of *Poa* in tufts; an abundance of sedge and several other plants, but none of it over six inches high at this time and covering the ground quite sparsely, on the whole, in no place more than half covering the ground and usually less. This was the prevailing flora of this Arctic-Alpine tundra.

When the pipit nests were approached on July 23, two adults were observed at a distance of one hundred yards and these swung about over the head of the observer, uttering notes of solicitude, a mild *peep*. Both birds were present at the nest with young throughout the afternoon of this day, but it was not ascertained whether or not both fed the young. No singing was noted. The camera was set up in the cavity beneath the fir blind, and the photographer climbed in beside it. The mosquitoes did, too. They came down the peek-hole of the blind in a steady cloud. The mere opening and closing of the hand would murder some and many others were murdered by deliberate methods, but, though the neck and sides of the face were covered and a steady swing of the arm was maintained, the forehead was soon a row of tubercles. By more mosquitoes, in broad daylight, the photographer has never been attacked.

An hour was spent with the pipits "peeping" near, before one came to the nest. Then one, having nearly reached the nest with a goodly load of food, became suspicious and turned back without feeding. Eventually, however, one began to come in regularly about once every five minutes, and six photographs were secured. The birds removed droppings twice. For the most part, however, the feeding adult would rush to the nest with a small amount of food, push it down a single mouth, and run away without searching for excreta. Only once or twice was more than a single young fed at a visit.

The photographer noted one bolus of excreta dropped by the walking adult not over thirty feet from the nest. The adult walked for long distances to and from the nest and began food-hunting frequently without having taken flight at all.

Throughout the afternoon the female maintained an almost constant "peeping," but on nest-approach would cry *tlyeep* or *cheep*. To this louder note the young responded vigorously, though they did not respond to the solicitous *peep*. Whether they recognized the character of this other note or became inured to the constant *peep* is not certain. Of course, the *cheep* or *tlyeep* was uttered but rarely.

The young did not have a sense of fear on this date though their eyes were widely opened and they were otherwise well advanced. They would respond repeatedly and attempt to seize objects that were thrust their way, and in other ways showed that they had not learned to discriminate sharply nor to have fear.

The adults seemed to have no great fear of the photographer but remained within fifteen to thirty feet (at least one did; the other was somewhat farther) while the photographer focused the camera or changed plates. They had, however, the great reluctance of approach that is necessary for nest-concealment, and they recognized a potential enemy at a great distance. Only two pipit songs were heard during the afternoon, and these from a bird occupying a territory at the foot of Fremont Mountain.

The incubating pipit was not seen to leave her eggs, but they were warm. The nest was approached from behind at 6:00 p. m. when the bird allowed the observer to come within two feet. She then sat for a moment, left without a sound, and climbed more than a hundred feet before alighting. Even then she made no sound. Only four young pipits were in one nest and four eggs in the other.

On July 25, the pipit nest with the young was reached by the observer at 2:15 p. m., and on this date only one adult was observed. This adult gave only one call, a *wheat*. The young had reached a surprisingly large size and seemed almost fully fledged. The concern of the parent bird had become so greatly reduced that the photographer not only left the blind, but focused the camera on the pipits outside, and sat beside his machine while the adult pipit continued to feed the young with the camera and photographer, two ogres, within three or four feet and in full view.

The young at this date nearly toppled out of the nest with eagerness as the adult approached with food. They had a loud *zeet* note. The adult walked to and from the nest for long distances and seemed to gather much food without flying.

On this date, exact feeding records were made from 2:49 p. m. to 4:10 p. m. During this period of 81 minutes, the young were fed 19 times. On three occasions two young were fed. These observations gave an average of 4.3 minutes between feedings. There was not a pipit song throughout the day on this date. All records of the feedings were made from a blind. Some later feedings were made while the photographer sat beside the camera. At one time it was noted that the pipit flew fully one hundred yards to the westward and on return alighted within two or three feet of the nest. The pipit incubating at the second nest allowed a very close approach before she deserted. She then flew out of sight without a note. The nest still had four eggs.

The nest containing the young was visited again on July 26. On this date there were four young. Again observations and photographs were made, with the photographer sitting near the nest beside his camera, and again records of feedings were carefully made. The first of these records was made at 1:35 p. m. and the last at 3:09 p. m. During this interval of 94 minutes, the young were fed 18 times, giving an average interval of 5.2 minutes between feedings. On two occasions two young were fed from the same mouthful.

The observer left the vicinity of this nest with its young immediately after the last feeding record had been made. Observations were continued at the top of near-by Burroughs Mountain. On this summit two pipits were observed giving their solicitude notes of *wheat*, and Pallid Horned Larks were also observed here. Although this region seemed to be suitable for nest sites for both of these birds, no nests were found. It should be noted that one pipit song was heard from the vicinity of Frozen Lake in the early afternoon.

The pipit nests were visited on July 27. The incubating female left her four eggs as before, but after flying for a distance of about 200 feet she alighted and called. In the other nest there were only two young. A third was about six inches away, dead and fly-blown. A fourth was in the heather about a foot from the nest. This fourth was replaced in the nest. The living young were lackadaisical under the sun, but as soon as they were shaded they exhibited activity. A young bird, upon turning, threw a bolus of excreta. This the female picked up and carried for a distance of only eight or ten feet before she dropped it.

As the female chased a blow-fly, her efforts brought her beneath the camera tripod and within a foot of the photographer. When she succeeded in picking up something near the nest she brought it

in promptly, though it might be small. She showed the same unconcern of the photographer and of the camera as on the two or three days just preceding. The nestlings on this date were almost devoid of down. They made feeble efforts to capture flies that settled on them. A single pipit on the east bank of Frozen Lake was noted expressing solicitude, and a short pipit song was heard at 4:00 p. m.

On July 29, the incubating bird left as before, and there were still four eggs. This bird had been incubating for a full twelve days. In the other nest there were, at this time, only two young, fully fledged. They showed little evidence of fear and did not crouch. The parent bird came in and fed them while the photographer was near. The young responded when she was near. The region occupied by the pipits had not been visited on July 28.

The White River camp area was left on July 29 and the long journey again made, by car, around the mountain to the Paradise area. Pipits were still in evidence in the Edith Creek amphitheater, but the nest that had given so much information and satisfaction was apparently deserted. The cause of this desertion was never learned.

This apparently deserted nest still had the three striking pipit eggs. They were so heavily covered with dark purplish cinnamon markings that their background was completely obscured. This speckling was thinnest or lightest toward the small end and presented an ill-defined heavier ring about the larger. At the larger extremity the cinnamon again paled to match the small end. In the case of the other two eggs, the cinnamon merely increased gradually in density to the large end.

The nest was not of extensive material. The foundation was of wide blades of sedge (of the previous year) and the remainder, of finer grass (*Poa* sp.) with some horse hair. This nest apparently had required no excavation, but appeared to be in the mouth of an old rodent burrow. There was no rodent activity on the "island" at that time, however, though the snow had gone from the vicinity, leaving rills still partially surrounding the "island," on the east, south, and west.

The flora about the nest was Indian paint brush, then blooming in profusion; two or three clumps of red heather; one tuft of potentilla; a little sedge; a little sparse *Poa* at the tip of the rock where the nest was situated; and a dense cover of what the ranger-naturalist called Alaska spirea (*Lutkea pectinata*) but what a companion identified as globe flower (*Trollius laxus*). This plant was only one or two inches high and, even in blossom, did not send its spiremes to

a height of more than three or four inches. It formed almost a mat on this pipit "island"; indeed it was the most abundant plant over the entire cirque and extended up to an elevation of 6,800 feet and above Timber-line Ridge.

Some pipit activities were observed in the Edith Creek amphitheater and a short song was heard in this same area. This might have meant that re-nesting activity was going forward in the case of the pipits with the deserted nest.

On August 1, a pipit was noted with food where ptarmigans were feeding, immediately below McClure Rock. This may have been a pipit of the Edith Creek territory. By watching this pipit we found a recent nestling, able to fly well. Presumably the bird must have been incubating when we searched this region in early July, although at that time we had not been able to flush the bird from a nest. On this supposition we may conclude that the pipits begin nesting here first at higher elevations, because these regions in places are freed earlier from snow, and that they then follow the season *downward*.

SUMMARY

1. Female pipit observed on July 5, apparently searching for a nest site.
2. The habitat occupied by the pipits on the Paradise side of Mt. Rainier was strictly Arctic because the region was still largely covered by snow.
3. The Arctic-Alpine home of the pipits on the Paradise side of Mt. Rainier was rimmed by Alpine firs and had therefore Hudsonian Life Zone conditions several hundred feet above the level of the observed nest.
4. Alpine fir mats occurred at higher elevation than the pipit nests at the base of Burroughs Mountain on the northeast side of Mt. Rainier because these firs were on a south-facing slope and pipit nests were apparently in distinctive Arctic-Alpine situations, again lower because they were placed in a region which had been covered with deep snow.
5. Males on July 5 in the Edith Creek amphitheater engaged in very vigorous battles.
6. On July 5, pipit songs were noted.
7. Pipit songs were given from the ground as well as from the air.
8. A pipit in flight song sings as it ascends to a height of four or five hundred feet, and sings as it descends, with its wings held up at a sharp angle.
9. Typical pipit flight song seems to be a *churee* uttered at intervals of two to three times per second on the ascent.
10. As the pipit descends it modifies its singing note and seems to sing *reechu*. The speed of utterance increases as the pipit descends.
11. The bird may ascend almost vertically and alight almost at the take-off position, or it may describe a huge parabola and alight several hundred yards away.
12. Songs were frequently heard in early July but seldom in late July. At the latter date, flight songs ceased altogether.
13. At the nest with young critically observed at the Burroughs-Fremont Mountain interpass, the male was not observed to assist in feeding the young.
14. Sexes of the pipits were determined by the behavior of the birds.

15. The pipit nest on the Paradise side of Mt. Rainier was under the margin of a small boulder, and on the Burroughs Mountain interpass one was in a clump of yellow heather and another beneath the leaves of a purple aster.

16. The pipit nest on Edith Creek cirque was placed on a small "island," a bit of ground that stood above the surrounding snow fields.

17. The pipit nest of the Edith Creek cirque was found complete on July 7, but not as yet with an egg.

18. The four pipit eggs in the nest of the Edith Creek cirque were laid at daily intervals, beginning on July 8.

19. Photographs were secured of the incubating pipit of Edith Creek cirque, first from a blind made of snow and secondly from a blind made by digging a hole in the "island" and surrounding it with upright boards.

20. The blind used in working with the pipit on the Burroughs-Fremont Mountain interpass consisted of a hole surrounded by branches of Alpine fir.

21. The nesting pipit, though at first very timid, quickly became so accustomed to the activities of the photographer that a blind became unnecessary. A blind, however, was continued in use on the Edith Creek cirque, but at the nest on the Burroughs-Fremont Mountain interpass, the photographer ultimately came out of the blind and sat beneath the camera tripod; this apparently did not modify the behavior of the parent bird.

22. The incubating pipit showed most concern when she viewed the lens of the camera, and frequently dashed away from the nest when she looked up and saw it.

23. In spite of the speed of the camera lens, the persistent tail-wagging of the pipit gave many unsatisfactory negatives because the pipit appeared tail-less in these photographs.

24. The female pipit of Edith Creek cirque would dash out from the nest to seize a fly and frequently also picked up stone-fly adults from the margin of Edith Creek.

25. Insects appeared to be numerous in the Arctic-Alpine habitat of the pipits.

26. The Paradise pipit nest was apparently deserted when this region was revisited on August 1, and careful descriptions of the purplish-cinnamon-spotted eggs were secured and the structure of the nest noted.

27. The pipit fed only insects to its young.

28. The insects fed were caught usually near the nest.

29. Two periods of nest feedings of the pipit nesting on the Burroughs-Fremont Mountain interpass were carefully timed. These showed that the bird fed at intervals of a little less than five minutes.

30. The pipit always carried droppings away from the nest, though these might be removed only a few feet.

31. Droppings that were extruded several inches from the nest were removed by the parent bird.

32. The pipit nest with four eggs continued to contain eggs until July 29, an incubating period of twelve days.

33. The young in the pipit nest found on July 17 and estimated to be two days of age or less were followed until July 29, a total of twelve days. In the beginning the nest found July 17 had six young, but four of these disappeared from one cause or another.

34. On July 29, the two pipit nestlings which remained were fully fledged.

35. Pipit nests discovered (a total of three) seemed to be in typical Arctic-Alpine situations.

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