

V. SOME BIRDS OF THE OKLAHOMA PANHANDLE

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Since very little has been published about the birds of the Oklahoma Panhandle, it seems advisable to make a report of my observations there during a period of fourteen years from 1908 to the present time—January 31, 1923.

The Oklahoma Panhandle, comprising the three counties of Cimarron, Texas, and Beaver, is thirty-four miles in width by one hundred and seventy miles in length; its surface is a high plain broken in the northwestern part of Cimarron county by the "Black Mesa," and the deep, rocky canyons of the Cimarron river and its many tributaries. The Beaver river, formed by the confluence of the Currumpaw and Seneca creeks, flows through a broad rather sandy valley in the southern part of this county and on through Texas and Beaver counties. Large sand hills and shifting dunes mark its course through Beaver county.

The land slopes eastward from an elevation of about 5,000 feet in Beaver county.

Groves of cottonwood, hackberry, and willow trees, and thickets of plum bushes occur at many places along the Beaver and Cimarron rivers. Cedars, pinyon, scrub oak, and chinaberry trees grow on the hills and in the canyons on both sides of the latter river. Stinking sumac, black current bushes, an occasional mesquite, many tree cactus and hundreds of acres of yucca plants, and sage brush together with native grasses comprise the wild vegetation of the region.

Farms and cattle ranches comprise most of this area and towns are few, Cimarron county having only two—Kenton and Boise City, and no railroad. It is in Cimarron county that conditions are ideal for birds that love isolated places. There are some sections of the larger ranches in this county which no human being visits for months, or possibly a year at a stretch and birds ranging therein lead lives differing but little from those lived by their ancestors in the days when the Indian and the buffalo held sway in this section of the plains.

Much of the data for this list was collected while I was riding after cattle on the different ranches, and in later years while traveling over the same country by automobile. In addition to this I have made many trips into the field for bird study alone, often spending as much as a week in some spot of unusual interest. The Marselus Bros., H. G. Wilson, C. F. Rowan, Brookhart Bros., and H. C. Labrier ranches near Kenton, and the A-11 ranch in the

southern part of the county were the best places for bird study in Cimarron county, while the Stonebreaker Zea, and old C.C.C. ranches along the Beaver river in Texas county and the sand hills in Beaver county yielded much valuable information along that line.

One hundred and twenty-four species are recorded in the following list; unless otherwise stated the record refers to Cimarron county. The species of which specimens were secured are designated by an asterisk.

**Podilymbus podiceps*: Pied-billed Grebe. Resident; not numerous; breeding among the reeds along large sloughs; nest found June 2nd, 1913 on Marselus Bros. ranch.

**Sterna antillarum*: Least Tern. A few breed along sloughs in the valley of the Cimarron, nest and eggs taken June 2, 1913.

**Mergus serrator*: Red-breasted Merganser. Migrant; one taken on H. G. Wilson ranch June 6, 1910, not numerous.

**Anas platyrhynchos*: Mallard. Numerous during migration, many of them spending the winter here.

**Nettion carolinense*: Green-winged Teal. Numerous during migration.

**Spatula clypeata*: Shoveller. Resident, not numerous; breed along the Cimarron and Beaver rivers; numerous during spring and fall months.

**Branta canadensis canadensis*: Canada Goose. Migrant; they occasionally settle on the rivers for a few hours and rest during high adverse winds. I saw about 400 in one flock pass over October 6th, 1922.

**Botaurus lentiginosus*: American Bittern. Migrant, not numerous.

**Ardea herodias treganzi*: Treganza's Heron. Summer resident. breeding in large numbers. Fifty-six nests were seen in a large dead cottonwood on Marselus Bros. ranch, June 25, 1911.

**Florida caerulea*: Little Blue Heron. Accidental; one seen occasionally in summer but they are not known to breed here.

**Grus mexicana*: Sandhill Crane. Migrant; observed in Beaver county, October 11, 1912 and April 20, 1913.

**Fulica americana*: American Coot. Resident the year around. Nest and eight eggs seen along a slough on Marselus Bros. ranch June 23, 1913.

**Gallinago delicata*: Wilson's Snipe. Summer resident; not numerous. Nest and three eggs taken on hay-meadow on H. G. Wilson's ranch, June 3, 1910.

**Tringa solitaria*: Solitary Sandpiper. Migrant.

**Bartramia longicauda*: Upland Plover. Migrant, not numerous; a few remain to breed. Two nests—one with three eggs and the other with four—seen on Marselus Bros. ranch June 24, 1910.

**Actitis macularius*: Spotted Sandpiper. Summer resident, not numerous. Nest and three young birds seen June 30, 1910 on H. G. Wilson's ranch.

**Numenius americanus*: Long-billed Curlew. Summer resident on the prairies of the entire Oklahoma Panhandle. Four nests with four eggs each seen July 1, 1913 near Boise City.

**Oxyechus vociferus*: Killedeer. Very numerous along Cimarron and Beaver rivers in spring and summer, arriving early in April. Nest with eggs taken April 20, 1912 on C. F. Rowan's ranch. It was among rocks and bushes under a river bank.

**Podasocys montanus*: Mountain Plover. Rather common summer resident, gathering in flocks for migration. Nest and eggs taken June 30, 1910 on Marselus Bros. ranch.

**Colinus virginianus virginianus*: Bob-white. Year around resident. Not numerous, but increasing in numbers yearly. Nest and ten eggs seen on Marselus Bros. ranch, June 24, 1911.

**Callipepla squamata squamata*: Sealed Quail. Year around resident. Not as numerous now as they were a few years ago. Nest and twelve eggs seen on C. F. Rowan ranch, June 11, 1911.

**Tympanuchus pallidicinctus*: Lesser Prairie Chicken. Very numerous in early days; then were rare for a number of years, but have been increasing rapidly during the past four years. Two pair and one nest seen on Marselus Bros. ranch June 20, 1913. One pair and nest seen on Stonebreaker Zea ranch, July 1, 1918.

**Pedioecetes phasianellus campestris*: Prairie Sharp-tailed Grouse. Once numerous, now rare. Observed six or seven on Marselus Bros. ranch on May 30, 1910. Some were dancing, ruffling their feathers, and making a peculiar cooing noise, as they were mating. Saw one nest which was a hollow in the ground, under a tuft of sandgrass on same ranch June 11, 1912. Four eggs in the nest. Saw three of these grouse on A-11 Ranch June 6, 1920.

**Centrocercus urophasianus*: Sage Grouse. Very rare: five observed in mating season, June 3, 1911 among the sage brush in A-11 pasture along the Beaver river. Some were strutting about, the sacs on their necks inflated and ~~and erect~~, and were hissing or buzzing. Nest and three eggs found June 13, 1911 on same ranch. Two birds seen July 1, 1920 on same ranch.

**Zenaidura macroura marginella*: Western Mourning Dove. Numerous summer resident, sometimes raising two or three broods

of young in a single season. A nest with two young birds was seen as late as September 25, 1911.

**Cathartes aura septentrionalis*: Turkey Vulture. Numerous in spring and summer, a few remaining during the winter. Fifty counted August 27, 1922.

Circus hudsonius: Marsh hawk. Resident.

**Accipiter velox*: Sharp-shinned Hawk. Common year around resident. Nest and eggs taken July 1, 1909 on Marselus Bros. ranch.

**Accipiter cooperi*: Cooper's hawk. Resident. Nest and eggs taken on C. F. Rowan ranch June 30, 1913.

**Buteo borealis calurus*: Western Red-tailed Hawk. Year around resident. Not numerous. Said to breed here.

**Buteo swainsoni*: Swainson's Hawk. Resident. Not numerous. Nest and eggs taken June 27, 1910, on Marselus Bros. ranch.

Archibuteo ferrugineus: Ferruginous Rough-leg or Squirrel Hawk. Resident.

**Aquila chrysaetos*: Golden Eagle. Rare year around resident. One seen at Kenton, September 24, 1922; one taken August 6, 1917 on Stonebreaker Zea ranch.

**Haliaeetus leucocephalus leucocephalus*: Bald Eagle. Rare; were once year around residents. One taken in a trap near Kenton January 15, 1923; it had a wing spread of seven feet.

**Falco mexicanus*: Prairie Falcon. Year around resident, not numerous. Two nests and two pair of falcons seen June 2, 1914; the nests were on the side of the "Black Mesa" and could not be reached.

**Falco sparverius phalaena*: Desert Sparrow Hawk. Year around resident; not numerous. One observed in Kenton, Dec. 12, 1922, chasing some English Sparrows.

**Asio wilsonianus*: American Long-eared Owl. Year around resident; not numerous. A nest and eggs seen June 14, 1913 on C. F. Rowan ranch.

**Bubo virginianus pallescens*: Western Horned Owl. Year around resident. Nest and eggs seen May 30, 1912 on Marselus Bros. ranch.

**Speotyto cunicularia hypogaea*: Burrowing Owl. Resident; once numerous in prairie dog towns but are less numerous since the prairie dog eradication campaign.

**Geococcyx californianus*: Road-runner or Chaparral. Year around resident; numerous. One was observed killing a rattlesnake eighteen inches in length, July 1, 1911. He pecked and tossed the snake until it died. No nests observed.

**Coccyzus americanus americanus*: Yellow-billed Cuckoo.

Rare summer resident. One nest seen June 9, 1912 on Marselus Bros. ranch.

**Ceryle alcyon*: Belted Kingfisher. Common summer resident. One nest with seven eggs seen July 1st, 1912 on Marselus Bros. ranch. The nest was at the end of a two foot tunnel in sand.

**Dryobater pubescens*, (Sub. Sp?): Downy Woodpecker. Year around resident, more numerous in summer. One nest in a hole in an apple tree seen June 7, 1913 on Marselus Bros. ranch. Four eggs were in the nest on bare wood.

**Dryobates salaris symplectus*: Texas Woodpecker. Year around resident. More numerous in summer than in winter. Nest with three eggs and one young bird seen June 29, 1913 on C. F. Rowan Ranch.

**Melanerpes erythrocephalus*: Red-headed Woodpecker. Common summer resident, a few spending the winter. On December 31st, 1911, one of these birds was observed digging live grasshoppers out of a hole in a cottonwood tree on Marselus Bros. ranch. The woodpecker had cached them months before.

**Asyndesmus lewisi*: Lewis's Woodpecker. Lewis Woodpeckers are not numerous but are seen the year around. One nest seen near Kenton, June 19, 1920.

**Colaptes auratus luteus*: Northern Flicker. Rare year around resident. One nest and seven eggs seen in a hole in a fence post on C. F. Rowan ranch. June 6, 1913.

**Colaptes cafer collaris*: Red-shafted Flicker. Numerous summer resident; twelve pairs had nests under a plank on top of an adobe wall on Marselus Bros. ranch July 1, 1910.

**Phalaenoptilus nuttalli nuttalli*: Poor-will. Rare summer resident; one taken on Marselus Bros. ranch, July 5, 1913. They are seen flying at dusk, and remain on the ground in daytime.

**Chordeiles virginianus henryi*: Western Nighthawk. Common summer resident. Two eggs found on a rock on Marselus Bros. ranch May 31st, 1913.

**Chaetura pelagica*: Chimney Swift. Rare summer resident. One nest with three eggs found on side of chimney on an old house on C. F. Rowan ranch June 6, 1914, is my only record.

**Selasphorus platycercus*: Broad-tailed Hummingbird. Rare summer resident. One nest and two eggs seen June 20, 1912 on Marselus Bros. ranch. One bird seen in Kenton, September 28, 1922.

**Muscivora forficata*: Scissor-tailed Flycatcher. Summer resident, not numerous. Nest of grass and rags with three eggs

seen June 19, 1914 on C. F. Rowan ranch.

Tyrannus tyrannus: Eastern Kingbird. Summer resident.

**Tyrannus verticalis*: Arkansas Kingbird. Very numerous summer resident. A nest on windmill in a yard in Kenton watched during July, 1921.

**Myiarchus cinerascens cinerascens*: Ash-throated Flycatcher. Very rare summer resident; one nest seen on C. F. Rowan ranch June 4, 1915. Two eggs were in the nest. One bird seen in Kenton June 6, 1920.

**Sayornis sayus*: Say's Phoebe. Summer resident, not numerous; nest and four eggs, seen June 26, 1912 on Marselus Bros. ranch.

**Myiochanes richardsoni richardsoni*: Western Wood Pewee. Summer resident. Nest and eggs seen June 3, 1920 on Marselus Bros. ranch. Not numerous.

**Empidonax minimus*: Least Flycatcher. Rare summer resident. Nest and four eggs taken May 29, 1913 on Marselus Bros. ranch.

**Otocoris alpestris leucolaema*: Desert Horned Lark. Common summer resident. Nest and four eggs seen on Marselus Bros. ranch, May 26, 1920.

Pica pica hudsonia: American Magpie. Eight or ten in a flock on the Brookhart Bros. ranch at the present time are year around residents and have been on the ranch three or four years. This is an extension of thirty miles east in their range and is the only record of the bird for the Oklahoma Panhandle.

**Cyanocitta cristata cristata*: Blue Jay. Year around resident, not numerous. Nest and four eggs taken on H. C. Labrier ranch June 21, 1913.

**Aphelocoma woodhousei*: Woodhouse's Jay. Common year around resident. Nest a platform of twigs in a pinyon, with three eggs, taken May 31, 1911 on Marselus Bros. ranch.

**Corvus corax sinuatus*. American Raven. Rare year around resident. Three nests seen on side of "Black Mesa" May 21, 1908. One bird seen near same place June 11, 1918.

**Corvus cryptoleucus*: White-necked Raven. Rare year around resident. Three adult birds seen June 1, 1909, one nest in a scrubby mesquite seen at the same time. The birds and nest were on the Currumpaw creek.

**Corvus brachyrhynchos* (sub. sp?): Crow. Observed only in Beaver county, May 3, 1913. Only one has ever been recorded from Cimarron county, (in June of 1903), so far as I know.

**Cyanocephalus cyanocephalus*: Pinyon Jay. Common year around resident.

**Molothrus ater ater*: Cowbird. Summer resident, very numerous. Eggs seen in the nests of Sparrows, Warbling Vireos and Bullock's Oriole.

**Xanthocephalus xanthocephalus*: Yellow-headed Blackbird. Uncommon summer resident, but abundant in early fall. One nest and three eggs taken June 19, 1914 on slough on C. F. Rowan ranch.

**Agelaius phoeniceus fortis*: Thick-billed Red-wing. Numerous in summer, a few remaining throughout the winter or until late fall. Nest and four eggs taken close to slough on Marselus Bros. ranch July 2, 1920.

**Sturnella neglecta*: Western Meadowlark. Year around resident, usually far more numerous in summer than in winter. Three nests seen near Kenton June 24, 1922.

**Icterus spurius*: Orchard Oriole. Numerous summer resident. Nest and five eggs seen in Kenton June 11, 1922. All eggs were hatched on July 3.

**Icterus galbula*: Baltimore Oriole. Numerous summer resident. Two nests seen in Kenton June 14, 1922. Young birds were in the nest June 29.

**Icterus bullocki*: Bullock's Oriole. Common summer resident. Two nests seen in Kenton, containing young, June 24, 1922.

**Euphagus carolinus*: Rusty Blackbird. Common migrant.

**Euphagus cyanocephalus*: Brewer's Blackbird. Common migrant, occasionally nesting here. Nest and four eggs seen June 1, 1910, on Marselus Bros. ranch.

**Quiscalus quiscula aeneus*: Bronzed Grackle. Numerous during migration. Occasionally seen in the summer. Three observed in Kenton, April 28, 1922.

~~**Actinagallus psaltria psaltria*: Arkansas Goldfinch. Common~~
summer resident. Nest with three eggs seen in a small willow tree on Marselus Bros. ranch, June 11, 1913.

**Spinus pinus*: Pine Siskin. Occasional winter resident, and in a few rare cases has been known to breed here. One nest with three eggs in a pinyon tree on Marselus Bros. ranch June 5, 1911.

**Rhynchophanes mccowni*: McCown's Longspur. Winter resident, not numerous; a few summer here. Nest and six eggs seen on Marselus Bros. ranch July 1, 1914. One bird seen near Kenton, June 21, 1922.

**Passer domesticus*: English Sparrow. Numerous year around resident, nests seen from March till November. Appeared here first late in 1903. They are less numerous now than in 1920.

**Chondestes grammacus strigatus*: Western Lark Sparrow. Common summer resident. Nest and three eggs seen June 30, 1922 in Kenton.

**Zonotrichia leucophrys gambeli*: Gambel's Sparrow. Winter visitant; not numerous at present (1923) in Kenton. First observed here December 11, 1922.

**Spizella passerina arizonae*: Western Chipping Sparrow. Common summer resident. Nest and four young birds seen July 2, 1922, in Kenton.

**Spizella pallida*: Clay-colored Sparrow. Common migrant and probable breeder.

**Junco aiken*i: White-winged Junco. Common winter resident. Sixteen seen in Kenton January 30, 1923. Occasionally breed here. One nest with three young birds seen June 28, 1910 on Marselus Bros. ranch. First nest record here.

**Junco hyemalis hyemalis*: Slate-colored Junco. Winter resident, not numerous; seven observed on C. F. Rowan ranch, December 17, 1919. Ten or eleven seen in Kenton, January 3, 1923.

**Junco hyemalis mcarnsi*: Pink-sided Junco. Winter resident, not numerous. Several were seen in Kenton December 11, 1921. Six were seen alive and one found dead in Kenton, December 28, 1922.

**Junco phaeonotus caniceps*: Gray-headed Junco. Winter visitant, not numerous. Observed for the first time January 8, 1919 in Kenton and again December 27, 1922 in Kenton when fourteen were seen. A dead one examined then.

**Amphispiza bilineata bilineata*: Black-throated Sparrow. Common summer resident. Nest and three young birds seen June 12, 1920, on Marselus Bros. ranch. Nest was in a tree cactus. Nest and two eggs seen at Kenton June 2, 1922.

**Peucaea cassin*i: Cassin's Sparrow. Summer resident, fairly numerous. Nest and three eggs seen June 1, 1916 on C. F. Rowan ranch. One bird killed accidentally by poison in Kenton, July 3, 1922.

**Pipilo fuscus mesoleucus*: Canyon Towhee. Common summer resident, many remaining throughout the winter.

**Guiraca caerulea lazula*: Western Blue Grosbeak. Common summer resident. Nest and four eggs seen on Marselus Bros. ranch June 21, 1914.

**Passerina amoena*: Lazuli Bunting. Summer resident, not numerous. Nest and three young birds seen on Marselus Bros. ranch July 1, 1914.

**Spiza americana*: Dickcissel. Summer resident, not numerous. Nest and five eggs seen June 20, 1911 on Marselus Bros. ranch.

**Calamospiza melanocorys*: Lark Bunting. Summer resident, not numerous. Nest and four young birds seen July 6, 1913 on C. F. Rowan ranch.

**Progne subis subis*: Purple Martin. Rare summer resident. One nest of straw in a hollow tree on Marselus Bros. ranch, June 9, 1914; it contained three eggs.

**Petrochelidon lunifrons lunifrons*: Cliff Swallow. Summer resident, very numerous. One hundred and eight-six seen repairing old nests on Marselus Bros. ranch, May 29, 1912.

**Hirundo erythrogastra*: Barn Swallow. Summer resident, fairly numerous. Seventy seen on C. F. Rowan ranch, building nests, June 2, 1913.

**Riparia riparia*: Bank Swallow. Summer resident, not numerous. Thirty-five or forty seen working on tunnels of nests in a cut bank of Seneca Creek, June 7, 1920.

**Bombycilla cedrorum*: Cedar Waxwing. Rare summer resident. Nest and four young birds seen on Marselus Bros. ranch June 15, 1914. One nest and three eggs seen on Brookhart Bros. ranch June 3, 1920.

**Lanius ludovicianus excubitorides*: White-rumped Shrike. Common summer resident. Nest with five young birds seen June 12, 1911. Nest was in a tree cactus on Marselus Bros. ranch. Fifty-six grasshoppers and 11 potato bugs were impaled on thorns nearby.

**Vireosylva gilva swainsoni*: Western Warbling Vireo. Summer resident, not numerous. Nest with one egg and two young birds seen June 1, 1916 on C. F. Rowan ranch.

**Dendroica aestiva aestiva*: Yellow Warbler. Summer resident, fairly numerous. Nest and four eggs seen on C. F. Rowan ranch June 3, 1916.

**Dendroica auduboni auduboni*: Audubon's Warbler. Migrant only. Common from May 1 to about May 15, and sometimes seen late in July.

Geothlypis trichas occidentalis: Western Yellow-throat. Summer resident.

**Oreoscoptes montanus*: Sage Thrasher. Rare summer resident. Saw three adult birds and one nest with 4 eggs in A-11 pasture June 13, 1920. Nest was of dry inner bark of cottonwood and grass roots lined with fine rootlets.

**Mimus polyglottos leucopterus*: Western Mockingbird. Summer resident, numerous. Nest and four young birds seen in Kenton June 29, 1922.

**Dumetella carolinensis*: Catbird. Summer resident, not

numerous. Nest partly built and the pair of birds at work seen June 1, 1910 on C. F. Rowan ranch.

**Toxostoma rufum*: Brown Thrasher. Rare, migrant.

**Salpinctes obsoletus obsoletus*: Rock Wren. Summer resident, fairly numerous. Nest with two eggs and one young bird seen June 13, 1918 on C. F. Rowan ranch.

**Catherpes mexicanus conspersus*: Canyon Wren. Summer resident, not numerous. Nest and three eggs seen June 11, 1920 on H. C. Labrier ranch.

**Thryomanes bewicki bairdi*: Baird's Wren. Summer resident, not numerous. Nest and three young birds seen June 17, 1918 on Marselus Bros. ranch.

**Troglodytes aedon parkmani*: Western House Wren. Summer resident, not numerous. Nest with no eggs seen June 1, 1918 on Marselus Bros. ranch. One young bird not long out of nest seen June 25, 1920 on C. F. Rowan ranch.

**Certhia familiaris* (subsp?): Brown Creeper. Rare winter visitant. One taken December 12, 1912 along Beaver Creek in Beaver county; and one seen January 11, 1920 on H. G. Wilson's ranch.

**Sitta pygmaea pygmaea*: Pygmy Nuthatch. Winter visitant, not numerous. December 10, 1913 one of these birds was seen caching suet between wood and dry bark of a tree.

**Baeolophus inornatus griseus*: Gray Titmouse. Winter visitant, not numerous. One seen January 6, 1920 on C. F. Rowan ranch. Six seen December 22, 1922 at Kenton.

**Psaltiriparus plumbeus*: Lead-colored Bush-Tit. Summer resident, not numerous. Nest under construction seen June 7, 1920 on H. C. Labrier ranch.

**Myadestes townsendi*: Townsend's Solitaire. Winter resident, not very numerous. Seven seen and one taken December 11, 1911 on C. F. Rowan ranch.

**Hylocichla ustulata swainsoni*: Olive-backed Thrush. Rare migrant, five seen and one taken May 21, 1912 on C. F. Rowan ranch.

**Hylocichla guttata guttata*: Alaska Hermit Thrush. Migrant, seen during the first two weeks of May. Eleven seen and two taken May 11, 1912 on C. F. Rowan ranch.

**Planesticus migratorius* (subsp?): Robin. Seen only in Beaver county, nest with two eggs seen and one bird taken May 28, 1913. No robins have ever been seen by me in either Texas or Cimarron counties.

Sialia sialis sialis: Eastern Bluebird. Summer resident. Nest

with three young birds found July 10, 1911.

**Sialia currucoides*: Mountain Bluebird. Winter resident, very numerous. Sixty-one seen on Marselus Bros. ranch December 3, 1918.

VI. PRESENT DAY OBJECTIVES IN ZOOLOGY

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Contribution No. 32, Second Series.

An attempt to define present day objectives in Zoology involves an examination of the problems upon which professional zoologists are working and an inquiry into the reasons for choosing these particular problems. The principal aim of science is to discover the character of the facts which constitute the realities of nature and to approximate as near as possible the explanation of these facts. The criterion of the accuracy of a scientific explanation, theory, or hypothesis is the extent to which predictions based upon it are borne out in subsequent happenings, and this implies the method of experiment.

There are few conclusions in science that may be regarded as absolutely and finally proven, for in the nature of the case absolute proof is unattainable. We regard conclusions in science as proved if they are supported by the available scientific evidence, if they are not contradicted by any scientific evidence, and if they are supported as time goes on by new discoveries. Persons not schooled in science or scientific logic sometimes demand a measure of proof which is unattainable. Many of the facts that science deals with involve processes of extremely long duration compared with which the span of human life is but a moment. The nature of the proof which can be used for such matters is very different from that which demands a short experiment that can be performed in a few moments with test tubes.

In the lifetime of many persons now living biology has developed from a descriptive science into an experimental one; indeed the most marked tendency of present day researches is the reliance upon the method of experiment and the attempt to state biological results in the exact terms of chemistry, physics and mathematics. In its early stages biology was purely descriptive. The problems which occupied the time of our great grandfathers in zoology were systematic in character. That is, they dealt with the classification of animals and the description of species. Then came the period of morphology and comparative anatomy, in which the attempt was made to trace structural relationships be-