The Young Naturalist

YOUNG NATURALISTS CLUB F. O. N.

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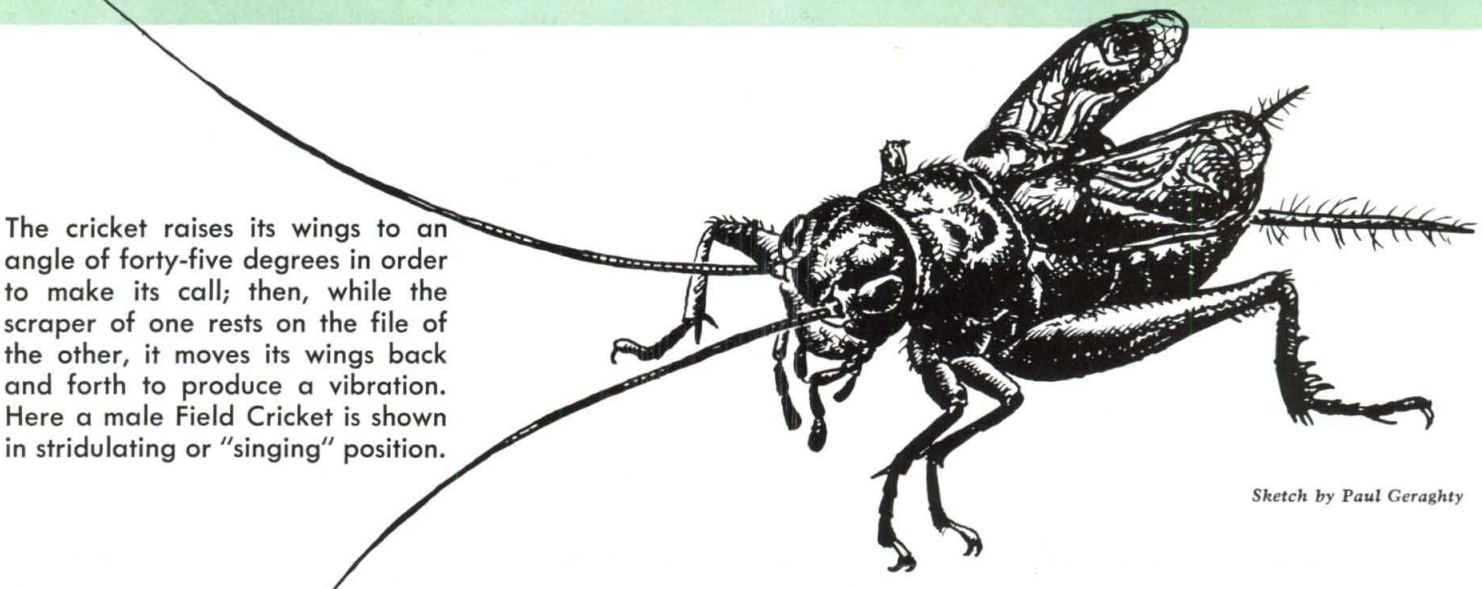


The cricket raises its wings to an angle of forty-five degrees in order to make its call; then, while the scraper of one rests on the file of the other, it moves its wings back and forth to produce a vibration. Here a male Field Cricket is shown in stridulating or "singing" position.

Sketch by Paul Geraghty

Music-makers of the Insect World

Not everybody would agree that the sound produced by insects is music, but, by whatever name it is called the insect chorus on a hot summer's night is too interesting to be ignored.

Many different insects produce musical sounds, and in a variety of ways. Although we may call these 'songs', it is a fact that few insects sing. They lack musical modulation and the note is nearly always at one pitch. The commonest way of producing sound is by stridulation in which one hard part of the body is rubbed against another part.

Crickets and long-horned grasshoppers are famous stridulators or "fiddlers". They produce songs by rubbing a sharp edge (the scraper) situated at the upper base of one front wing, along a file-like ridge (the file) on the underside of the other front wing. In between is a vibrating area or the 'tympana'. The cricket is an ambidextrous creature who can produce music with either wing, but the grasshopper is strictly a left-handed fiddler; some of his equipment is non-functional.

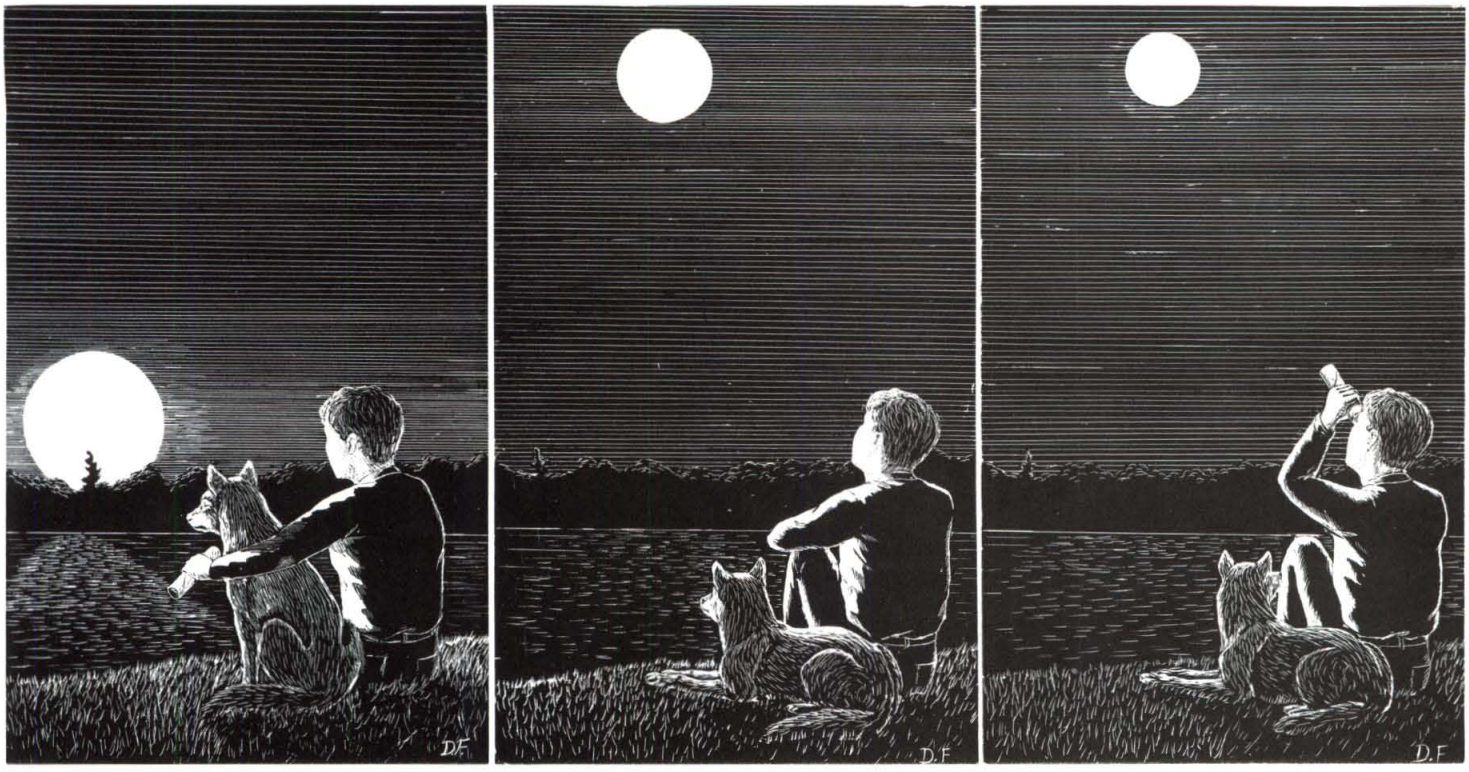
To make his call, the cricket elevates his wings to an angle of forty-five degrees with his body, then, while the scraper of one rests on the file of another, he moves his wings back and forth. A vibration is set up and a song produced. An expert is able to differentiate the species of crickets (and many grasshoppers) by sound. In fact, new species have been discovered in this way even before morphological characteristics were found.

You may easily observe the chirping of crickets if you use care. Walk slowly toward a cricket that is singing, stop when he stops, then again advance slowly when he resumes. If you do this very carefully, you will gain the cricket's complete confidence, and he will chirp away merrily even with a flashlight's beam shining on him.

Dr. R. D. Alexander of Ohio State University has studied insect sounds for many years. In fact, he and Dr. Donald Borror collaborated in producing a 12-inch long-playing phonograph record called "The Songs of Insects". With this record you can easily learn to distinguish some fifty different insect songs. One species, the Snowy Tree Cricket varies its chirps with the temperature. Add 40 to the number of chirps in 15 seconds, and you have a fair approximation of the temperature in degrees Fahrenheit. The hotter the weather the faster the Tree Cricket chirps.

The cicada has one of the most complicated sound organs in the whole animal kingdom. By comparison the vocal organs of birds are almost simple. While birds produce melody, our North American cicadas are famous only for

See MUSIC-MAKERS — Page 2



A group of young naturalists were looking at star constellations when a boy noticed the full moon just above the horizon. They all were amazed at its impressive size. Later in the evening they saw the moon well above the horizon. Now they were disappointed at how much smaller the moon appeared when it was higher in the sky. Then another boy picked up an empty tissue paper roll and peered at the moon through it. Much to his surprise the moon even appeared smaller. Try to explain the change in the apparent size of the moon in each case.

MUSIC-MAKERS — from Page 1

their shrill, staccato-like, unending buzzes. During July and August the cicada expresses himself loud and long; the hotter the day the louder he sings. Sometimes it is a congregational song; one male hears another male sing so he tries his best to outdo his rival; a third male joins in, and soon the whole neighborhood is vibrating with sound. The female cicadas have only rudimentary sound organs which has led a waggish poet to write:

"Happy are cicadas' lives
For they all have voiceless wives."

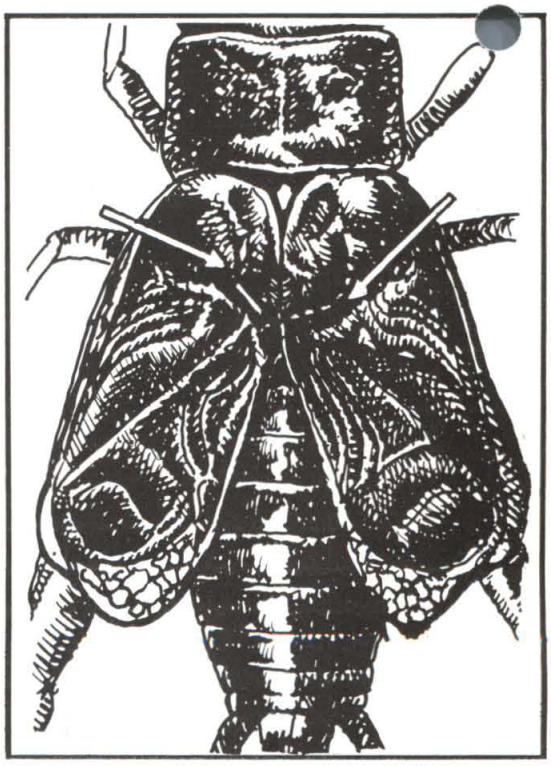
The cicada's sounds are produced by shiny, tense membranes on the sides of the body just above the hind legs. Powerful muscles attached to the inside of these membranes vibrate them rapidly to give the high-pitched sounds.

Species differentiation is possible by sound in the cicada also. Some years ago I travelled from Ontario to the far western United States and found it very easy to pick out species native to different areas.

A singular way of emitting sound is practised by the Death Watch Beetle. The larval or immature forms of these insects frequently inhabit old houses, where they live in burrows and feed on wood. As they feed they strike their heads against the front of the burrow and produce a sharp tick. This sound, heard by superstitious folk of an earlier day, was thought to be a portent of death, especially to the lonely watcher by a sick bed in the still of the night.

Most of us have listened to the contented hum of the foraging worker honey bee as she flits from flower to flower gathering pollen and nectar. Next time you see a bee enter a flower of the figwort family — snapdragon, foxglove or turtlehead — gently and carefully close the lips of the flower. When the bee discovers she is a prisoner, the pleasant hum will turn into a staccato-like angry buzz. The honey bee can produce many different sounds. These are well understood by the beekeeper, who listens to them as an indication of the state of a colony; the ex-

See MUSIC-MAKERS — Page 3



Sketch by Paul Geraghty

The arrow on the right wing case of this enlarged sketch of a cricket marks the position of the file on the *underside* of the wing case.

ANIMAL COMMUNICATIONS

The Ruffed Grouse makes a drumming noise by quickly beating his wings. He does this to tell other grouse to keep away from his territory.

The beautiful song of the Wood Thrush is also to keep other male thrushes away from his territory.

The male cricket's "chirp" is made by rubbing his wings together. His song indicates the territory he will defend and also attracts female crickets.

The beaver slaps his tail on the surface of the pond to alert other beavers of danger.

The dolphin is one of the most intelligent animals, and has a complicated language of squeaks. It uses its voice as a type of radar.

Rattlesnakes have loosely connected segments in their tails. These are vibrated to produce a buzzing sound when the snake is threatened

John Bateman

The Swallows of Tobermory

Do you remember the pre-Starling era in our towns and villages? Of course not. You are too young. The Starling invaded Ontario and "took over" from our native birds during the period from 1925 to 1940. In most built-up areas, the swallows, the flicker, the Red-headed Woodpecker, the Crested Flycatcher, the Bluebird and other native birds that lived near man's settlements either disappeared or were greatly reduced in numbers. The noisy, aggressive immigrant from Europe usurped their food supply and nesting cavities. Only the Robin and English Sparrow survived the foreign onslaught with any degree of success.

In one Ontario village, however, the old order sill reigns. Tobermory, at the tip of the Bruce Peninsula, is dominated by swallows, and the Starling is absent or scarce. Here, Purple Martins, Tree, Barn and Rough-wing Swallows swoop and sail throughout the summer months among the old wooden buildings, and over the luxury cruisers moored in the harbour. The air is constantly filled with their songs and calls, which mingle with the throatier sounds of the Herring Gulls and occasional blasts announcing the incoming ferry boat from Manitoulin Island.

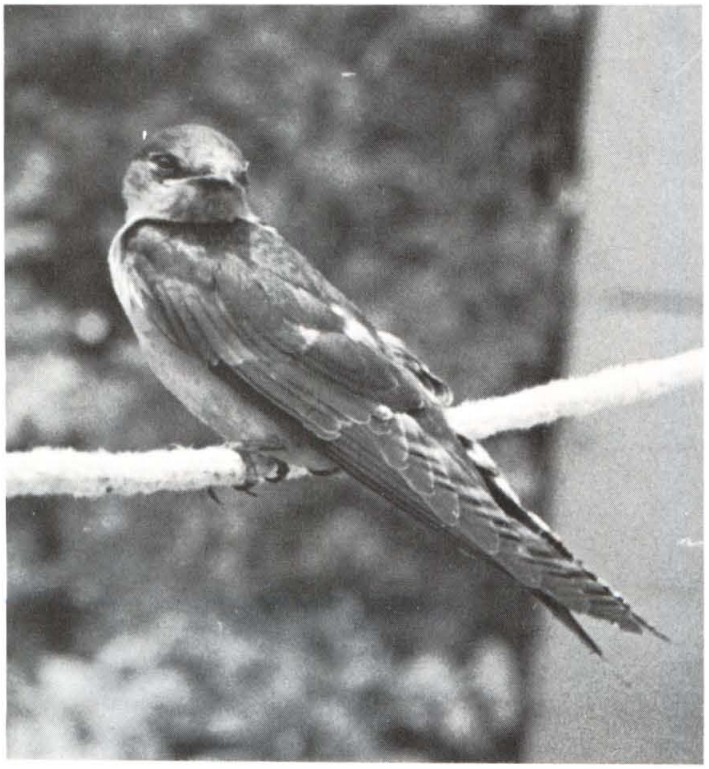
The reason for the Starling's scarcity is not known. If some magic formula to repel them exists, the native people of Tobermory aren't talking. The reason for an abundance of swallows can soon be found. Many wooden buildings, some unoccupied, are scattered about in a picturesque, disorganized manner. These buildings are a legacy of the years when Tobermory was an active commercial fishing centre. The eaves of these buildings provide good nesting sites for swallows. The proximity to open water furnishes the abundant insect diet preferred by swallows. To the East of Tobermory, under the overhanging limestone cliffs, you will find the Barn and Rough-wing swallows nesting just above the breakers.

Most conspicuous and appealing in the village are the Purple Martins. Whether perched on a T.V. antenna or flying to their nests in the eaves of houses, they are constantly singing. They give to Tobermory an atmosphere of rustic tranquility that really belongs to a bygone era.

Two miles South of Tobermory, at Ivan Watson's sawmill, is the swallow capital. The Barn and Cliff Swallow nest abundantly in the sheds and barn, some just above the roaring circular saws. Later in the summer the colony is enlarged by Rough-wings and Tree Swallows, forming concentrations of up to 1,500 birds before migration.

Incidentally, if you would like another view of the old-fashioned countryside, count the Bluebirds on the utility line between Tobermory and Watson's mill. You should score a dozen or more. That's the way it used to be and it still is up in the Bruce Peninsula.

M. D. KIRK



Ontario Department of Lands and Forests

The Barn Swallow, above, nests in barns and sheds. The Cliff Swallow often nests under the eaves of barns.

Ontario Department of Lands and Forests

The Tree Swallow nests in old tree stumps and posts near or in a wet area, but sometimes it uses a bird house.

Club News

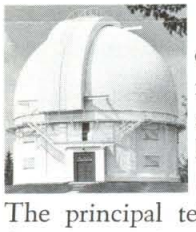
The Macoun Field Club of Ottawa published the twenty-sixth annual edition of its journal, *The Little Bear,* last summer. Edited by Ross King, its thirty pages contained articles by club members on their observations, projects and interests during the year, and reports on club meetings and field trips. The twenty Senior members held weekly meetings, usually with guest speakers; they also went on ten field trips in the vicinity of Ottawa — birding, animal tracking, cave exploring and visiting the Dominion Observatory. Four of the field trips were to the club's new Nature Study Area near Bell's Corners, where the group has begun a long-term nature study project. Members will be studying the reptiles, amphibians, birds, mammals, vegetation and general ecology of the area, which includes dry upland woods and beaver ponds.

The sixty-seven Junior and Intermediate members of the Macoun Club took part in four field trips between September and May, to Shirley's Bay for bird observations, the Dominion Observatory, an iron mine in Quebec and Gatineau Park.

The Macoun Club Library increased in size and quality during the year, and now contains over 350 books. During the year, also, a monthly newsletter was produced by the senior group, under the editorship of Secretary Kathy Fairbarns. Kathy writes that in the coming year the newsletter will be expanded to include more book reviews and an editorial, as well as news of meetings and speakers.

BARBARA WILKINS

Canada's Largest Optical Telescope



On a prominent hill one mile south of Richmond Hill, Ontario stands the David Dunlap Observatory of the University of Toronto. The principal telescope, a 74-inch reflector, was the second largest in the world when completed in 1935. Built with funds donated by Mrs. Jessie Donalda Dunlap, the observatory stands as a memorial to her husband. The telescope has a length of 30 feet, and a diameter of nearly 7 feet — large enough for a man to stand inside. In a reflecting telescope curved mirrors are used, rather than glass lenses, to collect and focus the light from a star or galaxy. There are two pyrex (a form of glass) mirrors: the 'secondary' with a diameter of 14 inches located at the upper end of the telescope; the 'primary', at the bottom end of the telescope, having a diameter of 74 inches and thickness of 18 inches — 5000 pounds of solid glass! The total weight of the telescope is 25 tons, but because it has been carefully balanced on its supports, it can be easily moved with one hand. An instrument called a 'photometer', attached to the side of the telescope tube, is used to measure the brightness and colour of a star. The large triangular instrument at the bottom of the tube is a 'spectrograph', used to analyze in detail the light of a star. With the spectrograph astronomers are able to determine the surface temperature, atmospheric pressure, speed, and chemical composition of a star.

The telescope is mounted inside a 'dome' that serves to protect the delicate surfaces of the mirrors from rain and snow, and shields it from being buffeted by the wind. The dome can be turned in a complete circle, and a pair of shutters open to allow the telescope to be pointed at almost any part of the sky. To insure sharp images the air temperature inside the dome must always be lower than that outside. There is no source of heat inside the dome, and astronomers have occasionally worked in it as long as twelve hours on a winter's night at temperatures down to 15°F.

Interested persons are invited to visit the observatory. Visiting hours are from 10 to 11 o'clock each Tuesday morning throughout the year, and Saturday evenings from April to October.

MUSIC-MAKERS — from Page 2

cited, agitated hum of a queenless colony; the angry buzz that tells when an intruder, such as the wax moth, has entered the hive; and there are sounds associated with swarming.

To produce the desired note, the rate of vibration by the wings must be duly adjusted. According to the entomologist, Comstock, who lived many years ago, a vigorous honey bee will produce middle "A" at 435 vibrations per second.

We are told that "C" of the lowest octave requires 32 vibrations per second, which is one of the lowest notes used in music. Think of the tremendous energy and muscular action required to make the wings beat so rapidly that a musical sound is produced.

Who has not listened during a hot, humid night to the jarring whine of the mosquito? You lie there wondering when the attack will begin and finally, in desperation, you get up and launch your own counter attack, which is frequently futile. So you return to bed and, sure enough, after the lights are out, the bomber's whine starts up again. Only the female mosquito, by the way, bites and she does this to get a blood meal, but nobody seems to be certain why. In any event, believe it or not, the sound you hear is a love song. It seems that the female pitches the notes so as to set the antennal hairs of the male in vibration. Once he is tuned to the right wave length, the male seeks out the female mosquito and mating occurs.

H. B. WRESSELL

The telescope of the David Dunlap Observatory is the reflecting type.

WOODLORE
FOR THE NATURALIST

John Macfie

Choosing Fuel For A Campfire

Even where wood is abundant, as along wilderness canoe routes, camp fire wood should be selected with care. Dry hardwood is best: it burns slowly, without excessive smoke and sparks, and forms a good bed of coals. Select dead saplings or limbs from which the bark has fallen, thus allowing the wood to cure instead of rotting.

Dry wood breaks with a sharp "crack". Green or wet wood tends to bend rather than break, or it breaks with a duller sound.

Dry wood from dead coniferous trees makes the best kindling, but it produces a large blaze and many sparks if used in quantity.

Even in the wettest weather, dry kindling can be found in the brittle, dead lower branches of standing evergreens, or in old burnt pine or cedar stumps. Loose curls of bark hanging from birches make excellent tinder. Do not strip off birch bark that adheres firmly to the trunk; doing so disfigures the tree and creates an opening through which disease might enter.

A camp fire must be placed at least ten feet from a tent and away from dry brush, leaves or grass. To reduce the risk of causing a forest fire, it must be built on a bare mineral soil or rock. To build the fire, ignite loose tinder (birch bark, shavings, or paper) on the windward side of the fireplace, add finely cut kindling, and then, as the fire builds up, larger wood. Keep a pail of water close by, and watch the area downwind for smoldering sparks.

Before leaving a campsite, drown your fire completely, then feel the ashes for hot spots. If a bare rock at the waters edge was chosen for the fireplace, the entire remains may simply be swept into the lake.

CHOP INTO A FIRE-CHARRED PINE STUMP FOR EXCELLENT KINDLING

DEAD LOWER BRANCHES OF AN EVERGREEN TREE MAY BE DRY IN THE WETTEST WEATHER

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