Is that a Dead Branch or a Tawny Frogmouth?

by Chris Smith,
Animal Technician I
Oklahoma City Zoological Park

Suppose you confronted a creature with the following description: a disproportionately large head, large glowing yellow eyes, a wide mouth with a short hooked beak; a short body with small twig-like legs, and plumage that resembles tree bark. Although it may appear to be one of Jim Henson's muppets, this is actually a general description of the Tawny Frogmouth *Podargus strigoides*

Frogmouths are related to nightjars (two better-known species of nightjar are the Whippoorwill *Caprimulgus vociferus*, and the European Nighthawk *C. europaues)*. All of these birds are classified into the order Caprimulgiformes. The members of this order are characterized by wide gaping mouths, short beaks, cryptic coloration, and nocturnal lifestyles. Nightjars are usually small, have long narrow wings, and feed during flight. Frogmouths, on the other hand, are much larger than most nightjars and have short, broad wings. Frogmouths are subdivided into the family Podargidae.

Podargidae consists of 12 species of frogmouths. The Tawny Frogmouth is one of the larger species, weighing from 300 to 600 g. In captivity, specimens frequently weigh in excess of 600 g. Average length ranges from 33 to 47 cm, while the wingspan usually ranges from 65 to 100 cm. There are seven known subspecies of Tawny Frogmouth.

The plumage of the Tawny Frogmouth is colored with a variety of browns, grays and rusts arranged in a pattern that gives the bird an appearance of a tree branch or bark. Males and females are similar in appearance. One small difference between the sexes is in eye coloration. Males may have an orange-brown ring surrounding their iris, while this ring has not been known to appear in females.

The Tawny Frogmouth is native to Australia and Tasmania, and can be found throughout the continent. It is also found on several of the larger islands surrounding Australia, including Kangaroo, Groote and Fraser Islands. There are also unconfirmed reports in southern regions of New Guinea. These birds prefer woodlands and forests in which they can conceal themselves, even though adult Tawny Frogmouths are rarely predated upon. One known predator, however, is the Barking Owl *Ninox connivens*. Larger snakes will also occasionally prey upon them.

The Tawny Frogmouth has shown a preference for eucalyptus trees. The camouflaged plumage of these birds allows them to blend in with their surroundings. When startled, they assume an upright posture by raising their heads and straightening their backs. This posture gives the bird the appearance of a dead branch which is so effective the Tawny Frogmouth is rarely seen in the wild, even by well-trained ornithologists. Many zoo visitors are unable to locate a bird only a few feet away from them.

The natural diet of the Tawny Frogmouth consists mainly of insects, small reptiles, amphibians, mammals and occasionally includes small fruits. Frogmouths can catch food while in flight, like the small nighthawks but they usually catch prey by chasing it on a branch or by ambushing it by jumping on it from an overhead branch. These birds also scavenge for dead insects on road surfaces which results in many Tawny Frogmouths killed by traffic. Their cap-

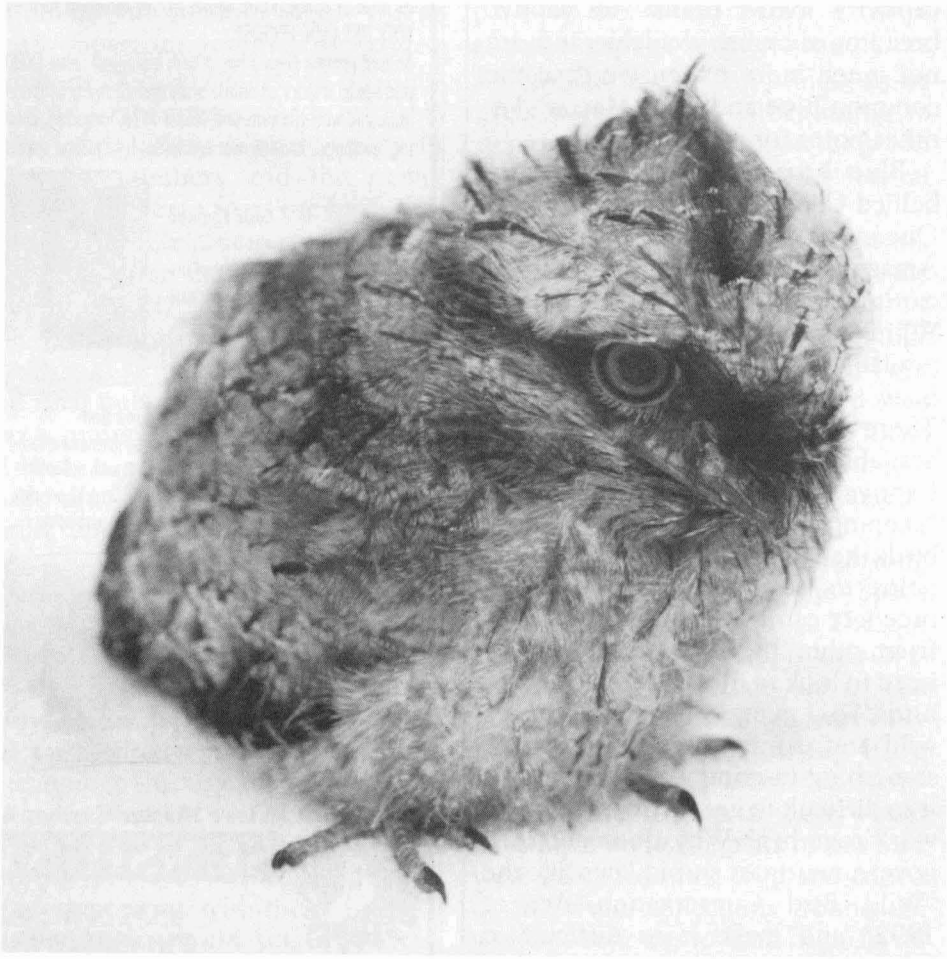

Photo by Chris Smith

Tawny Frogmouth, Podargus strigoides, *3 weeks old*

tive diet usually consists of mice, crickets, mealworms and Bird of Prey Diet, a commercially packaged food supplement.

Breeding season in the wild lasts from August to December, although captive birds have been known to breed throughout the year. A loose nest of small twigs is built and maintained by both the male and female in the crotch of a tree or on a nest platform. One or two white eggs, approximately 45 mm x 30 mm, are incubated by both parents. Incubation lasts 28 to 30 days. The Tawny Frogmouth was first kept in captivity in 1862 at the London Zoo. They are fairly easy to maintain in captivity and wild-caught birds usually adjust well to their new surroundings and often will breed readily in captivity. The first captive hatch was at the Wassenaar Zoological Park in Holland.

The Tawny Frogmouth is a popular exhibit species with zoo visitors and personnel. As of December 1992, 169 (85.56.28, i.e., 85 males, 56 females and 28 unsexed birds) Tawny Frogmouths were being kept by 51 institutions throughout the world. More than 75% of these birds are captive-born. Of the 12 species of frogmouths, the Tawny is the only one currently managed in captivity. Although the Tawny Frogmouth is relatively common in its natural state, very few birds are exported due to Australia's wildlife protection and export laws.

The Oklahoma City Zoological Park has exhibited the Tawny Frogmouth since 1981, when a pair of captive-hatched birds was obtained from the New York Zoological Society/Wildlife Conservation Society (formerly Bronx Zoo). These birds have been exhibited in a 2.5 m x 2 m x 2 m enclosure, with several medium-sized perches and plants to offer the birds hiding and nesting areas. The birds settled into their new surroundings quickly. Unfortunately, the female died within a year and it wasn't until 1984 that a new female could be obtained. Due to a larger male population in captivity, females are in great demand, often making it difficult to acquire them.

Within a year of introduction, the pair began nesting and soon successfully hatched one chick. Supplemental feedings were given to the chick two times a day for the first few weeks, although the parents were doing a fine job in raising the chick themselves.

After the chick had grown and been separated from its parents, the female began producing eggs again, but many of the eggs were found broken. When eggs were found intact, they were pulled for artificial incubation and replaced by dummy eggs. Only one chick subsequently hatched, but it died shortly after hatching.

In 1986, the female died, leaving the male alone again. During her lifetime, she had laid 10 eggs; two hatched, one survived, three died in the shell, one was infertile, and four were found broken.

In 1990, a young captive-raised female was acquired from the San Antonio Zoological Gardens & Aquarium. Again, within a year, nesting was observed and eggs were produced. After two eggs were found broken, all eggs found subsequently were pulled and replaced with dummy eggs. In both May 1991 and April 1993, chicks were successfully hatched and handreared.

The first egg hatched was artificially incubated at 36.9°C. The wet bulb reading was maintained near 29°C. The egg

was hand-turned five times daily until the developing chick broke through the air cell. When the chick pipped, warm water was sprayed into the incubator to increase the humidity and prevent the egg's membranes from desiccating. The chick hatched unassisted following a 30-day incubation period.

The same procedure was used for the second egg, however the incubation temperature was 37.5°C because the egg had been placed in a different incubator. (The egg was not subsequently moved to an incubator at 36.9°C to avoid subjecting the developing egg to a sudden temperature change that could threaten its development.) The chick hatched unassisted after 24 days and suffered no ill effects from the higher-than-normal incubation temperature.

After hatching, the chicks were left in the incubator to dry for 24 hours before being moved to an isolette (infant incubator). The chicks were not fed during this time to allow their yolk sacs to be absorbed. The isolette used was constructed of a Plexiglas box with a 150-watt electric heating unit mounted to a removable lid. A small sliding door on the front was used to remove the chicks during feeding and cleaning.

The isolette was initially heated to 32°C. The temperature was gradually decreased as the chicks grew and became feathered out. A cloth-covered bowl served as a nest for the first few weeks until the chicks could grasp well enough to use a small perch. The linens were changed and the isolette was disinfected daily with Roccal-D, a general disinfectant.

The chicks' diet consisted primarily of chopped newborn mice (pinkies) and crickets with their heads and appendages removed. As the chicks grew, adult mice (skinned and chopped) were added. Two vitamin supplements, Vionate and D-Ca-Fos were lightly sprinkled on the diet. D-Ca-Fos is a vitamin D, calcium and phosphorus supplement. Vionate is a general vitamin and mineral supplement which is used for adult birds as well as hatchlings.

The chicks were fed four times a day: 0800, 1100, 1400 and 1700. An additional night feeding was also given for the first two weeks. The amounts eaten by the chicks were recorded on data sheets after each feeding.

The chicks were weighed before each early morning feeding for a more accurate measurement of their growth (see Table I), because extra weight from their diet was not included in the measurements.

Newly hatched chicks are covered with a white down, with a little light gray down blended in. The chicks' eyes are open a few days after hatching. They grow quickly and, by the second to third week after hatching, the flight feathers are clearly visible and much of the white down has been replaced with brown and gray contour feathers. At four weeks, the flight feathers are developed well enough for the chick to fly short distances. At this age, the chicks fledge; however, they are still only about half the size of the adults and still require their parents' care. By the sixth week, the young birds have reached adult size.

In May 1993, while one chick was being handraised, the adults laid another egg. Since the pair had demonstrated great care in sitting on dummy eggs, the egg was left with them. The egg was laid in a nest basket of bromeliads hung at about 2 m high. The male was observed doing most of the incubation throughout the day. A chick was found in the nest 30 days after the egg had first been seen.

Crickets, with the hind legs removed, and waxworms were continuously offered through the day. The insects were placed in stainless steel bowls. The slick surface of the bowls prevented them from escaping. The adults quickly depleted the supply of insects to feed to their offspring. The chick was also given supplemental feedings of chopped pinkies, crickets and waxworms by the keeper staff for the first two weeks although the parents were doing an excellent job of raising the chick.

As the chick grew, it was closely monitored, although no problems arose. The chick left the nest after 24 days, but continued to stay close to its parents.

With the end of the mating season, life returned to normal for the Tawny Frogmouths. The success with raising two chicks in a season gives the bird department a great deal to look forward to next season. We hope to continue our success with the breeding program of these strange and interesting birds.

The next time you visit a zoo and find yourself standing in front of what appears to be a vacant exhibit, take a second look. You may find what appears to be a dead branch staring back at you.

Table I
Daily Weight Gain of Hand-Raised Tawny Frogmouths (in grams)

Day	1991 Hatch	1993 Hatch	Notes
1	12.9	11.8	temp at 90° F
2	14.6	13.7	
3	14.5	17.4	
4	16.8	23.0	
5	19.2	24.9	
6	22.2	29.9	
7	21.2	36.3	
8	24.5	39.7	temp at 85° F
9	26.3	44.1	
10	29.9	52.1	
11	33.0	58.3	
12	39.2	67.1	
13	52.0	71.4	
14	56.0	84.1	discontinued night feedings
15	59.5	96.0	
20	72.4	105.8	
25	75.9	110.8	
30	124.0	162.8	ready to fledge
35	167.1	166.5	
40	197.9	165.0	
45	191.2	195.4	
50	218.5	229.5	

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Products Mentioned in Text

D-Ca-Fos Natural Bone Ash with Vitamin D3 Supplement produced by Fort Dodge Laboratories, Inc., Fort Dodge, Iowa 50501.

Nebraska Bird of Prey Diet packed by Central Nebraska Packing, Inc., North Platte, Nebraska 69101.

Vionate Vitamin Mineral Powder produced by Gimborn-Rich Health, 4280 Northeast Expressway, Atlanta, Georgia 30340.

Roccal-D manufactured by The Upjohn Company, Kalamazoo, Michigan 49001.

Isolette manufactured by Regal Plastics, Oklahoma City, Oklahoma 73127.

Heating unit produced by Lyon Electric Company, Inc., Chula Vista, California 92011.