The First Report on the Death of an Oriental White Stork from the Japanese Reintroduced Population Caused by the Accidental Ingestion of an Artificial Material

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ABSTRACT

An oriental white stork (Ciconia boyciana), which had been rescued after hatching in a nest on an electric pole in Shimane Prefecture, was released after hand rearing at Hyogo Park of the Oriental White Stork. However, the bird was found dead after 27 days in Tottori Prefecture. Necropsy revealed three pieces of foam rubber (840 mm in total length) in the bird’s gizzard. This finding suggested that the bird was weakened and died because of the lack of digestion and absorption of food owing to the accidental ingestion of foam rubber. This is the first report of accidental ingestion of an artificial material causing death in the reintroduced population of oriental white storks in Japan.

Key words: accidental ingestion, oriental white stork, reintroduction

The oriental white stork (Ciconia boyciana) is a large bird belonging to the order Ciconiiformes, and is distributed in the Russian Far East, Northeast China, Korean Peninsula, Taiwan, and Japan. The breeding population of this species in Japan became extinct when the last individual died after being rescued in 1971. Thereafter, a captive population in Japan was established by breeding between founders that consisted of birds donated to Hyogo Prefecture from Russia, birds imported to zoos in Japan from China, and wild birds which had bred in other countries and were rescued in Japan after migration. Reintroduction of the selected birds started in 2005 [1, 2]. In 2007, a chick was fledged in the wild in Japan for the first time since 1961, and the oriental white stork has continued breeding successfully since then [3].

An ecological survey based on colored rings attached to the legs of almost all individual birds showed that the stork population in Japan, which includes released individuals, their descendants, and wild individuals that migrated from other countries and resided in Japan, had increased to 124 by the end of 2017.

In Hyogo Park of the Oriental White Stork (HP-OWS), pathological examinations of oriental white storks that had died in the wild in Japan have been conducted since 2005. In this report, we documented the first case of death of an oriental white stork from the Japanese reintroduced population, caused by the accidental ingestion of an artificial material.

The male bird (individual number J0176) hatched on, or after, day 1 (April 25, 2017), in a nest on an electric pole in Daito-cho, Unnan City, Shimane Prefecture [4]. In 2007, a chick was fledged in the wild in Japan for the first time since 1961, and the oriental white stork has continued breeding successfully since then [3].

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The male bird (individual number J0176) hatched on, or after, day 1 (April 25, 2017), in a nest on an electric pole in Daito-cho, Unnan City, Shimane Prefecture [4]. His male parent was individual number J0118 (hatched on June 14, 2014, and released from the facility in Echizen City, Fukui Prefecture, on October 3, 2015), and his female parent was individual number J0047 (fledged on June 7, 2012, from the artificial nesttower at Toshima in Toyooka City, Hyogo Prefecture). The bird was rescued with three other siblings from the nest on day 27 because the female parent had been mistaken for a heron and was shot by a hunter engaged in the extermination of harmful birds. The bird’s body weight at the time of rescue was 2700 g, and showed no abnormalities in general health (Fig. 1). A part of the wing feather was painted with Animal Marker (FG2000; MUROMACHI KIKAI Co., Ltd., Tokyo) for

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in Tottori City, Tottori Prefecture. The bird was observed to have bradykinesia and poor feeding between day 90 and day 95. It was clear that the bird survived until day 103, on the basis of information provided by residents. However, on day 106, the bird was found dead in an agricultural irrigation canal beside a rice field in Ketaka-cho, Tottori City, Tottori Prefecture, 27 days after release (Fig. 3). The carcass was collected and stored in a freezer until the day before necropsy.

Necropsy was performed at HP-OWS on day 116. In conjunction with no subcutaneous or intra-abdominal fat
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accumulation, and remarkable atrophy of the pectoralis major muscles, the bird’s body weight had decreased to only 2850 g, compared with 3750 g before release. The feathers on the head and neck quickly fell out because of the slight tissue degeneration after death. A lacerated wound of about 20 mm in diameter and a subcutaneous hemorrhage around the wound were noted on the ventral side of the right brachial region. In addition, subcutaneous hemorrhages of about 50 mm in diameter in the neck, and 20 to 30 mm in diameter near the left rib, were detected. Water was not detected in the trachea or bronchi. The lower esophagus contained a small amount of food, presumably crayfish legs. The gizzard was remarkably expanded, and three pieces of black flexible foam rubber (13 mm × 25 mm in cross section; 150 mm, 220 mm, and 470 mm in length) (Fig. 4) filled the gizzard; only a small amount of food material, presumably beetles, stag beetles, and grasshoppers, was present. Almost nothing was found in the small and large intestines. Histopathological examination could not be conducted because the postmortem changes were too advanced.

Perforation and diverticula formation of the ventriculus have been reported as pathological findings resulting from accidental ingestion of artificial material in bird species [5-7]. In our case, perforation and diverticula formation were not observed and the mucosal lesion could not be detected because postmortem changes in the internal organs were too advanced. The cause of the wound and hemorrhage was unclear, but it was presumed that these might have formed when the bird died and fell from the electric pole roost beside the agricultural irrigation canal. Because postmortem changes of the internal organs were advanced, it was difficult to identify the lesion. It was also not possible to measure the weight of muscles and organs to detect the weight loss generally seen with prolonged malnutrition. Drowning was contraindicated owing to the absence of water in the trachea and bronchi.

There are many reports of wild birds ingesting plastic debris, especially in seabirds such as shearwaters and albatrosses [8-10]. In these cases, it is thought that seabirds misidentify plastic debris as food materials, such as fish and squid. Accidental ingestion of artificial materials has also been reported in California condors (Gymnogyps californianus), which were once extinct and reintroduced into North America [11]. The reason for the mortality of nestlings by artificial materials and the behavior of parent birds that feed artificial materials is controversial in that they may be misidentified as bone and shell, as a calcium source for nestlings, or be substituted for the grit that helps digestion [12-13]. Conversely,
there are few reports on ingestion of artificial materials in Ciconiidae. Peris et al. [14] analyzed 94 white storks (Ciconia ciconia) in Spain and reported that plastics were detected in the gizzard or esophagus of 40 birds. In addition, Henry et al. [15] investigated 227 nests of white storks in France and collected rubber pieces from 12 nests. On the basis of pathological autopsies of 57 white storks, the authors also reported that 5 white storks had died because of weakness caused by the accidental ingestion, and gut occlusion, of rubber pieces. Both reports suggested that accidental ingestion was caused by the feeding behavior of white storks at dumping grounds. These behaviors have been well documented in accordance with the increase in the stork population [14]. In addition, Sazima et al. [16] observed that wood storks (Mycteria americana) swallowed plastic cables 60 to 70 cm in length, and believed that the storks mistook pieces of plastic cables for similar shaped prey. A previous study reported that oriental white storks feed on various creatures, such as crustaceans, insects, fish, amphibians, and reptiles including the Japanese rat snake (Elaphe climacophora), Japanese pit viper (Gloydius blomhoffii), tiger keelback (Rhabdophis tigrinus), and Japanese striped snake (Elaphe quadrivirgata) [17]. Citizens have also observed oriental white storks feeding on Japanese eel (Anguilla japonica) (Ohsako, personal communication). It was suspected that the bird in our case accidentally ingested foam rubber pieces after mistaking them for snakes or eels, which have long and narrow bodies. Juvenile birds also have a lesser ability than adult birds to discriminate natural foods from indigestible objects, according to previous reports of white storks [14-15] and wood storks [16]. It is possible that oriental white stork juveniles also have a similar ability for erroneously selecting indigestible objects.

This is the first report of the accidental ingestion of an artificial material directly resulting in the death of an oriental white stork. The size of the reintroduced population of the oriental white stork in Japan has linearly increased since the start of the release program in 2005 [18]. In the future, the incidence of accidental ingestion of artificial materials may increase along with the increase in population size of the oriental white stork in Japan. It is necessary to accumulate further data from pathological examinations in order to epidemiologically analyze disease and accidents in the reintroduced oriental white stork population.

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症例報告 その他

日本のコウノトリ再導入個体群における人工物の誤食に起因した死亡の初報告

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要 約

島根県内の電柱上の巣で孵化した後に救護されたコウノトリが、兵庫県立コウノトリの郷公園で人工育雛され放鳥されたが、27 日後に鳥取県内で死亡して発見された。病理解剖により筋胃内から発泡ゴム 3 本（長さ合計 840mm）が回収され、発泡ゴムの誤食により食物を消化吸収できずに衰弱して死亡したと考えられた。本報告は、日本のコウノトリ再導入個体群において、人工物の誤食が直接的な原因で死亡した初めての報告である。

キーワード：コウノトリ, 誤食, 再導入

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