

# DEATHS FOLLOWING INGESTION OF A CARDIOTOXIC PLANT IN KAMPUCHEAN CHILDREN IN THAILAND

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## INTRODUCTION

Twenty-seven Khmer children at a refugee camp on the Thai-Kampuchean border developed vomiting, diarrhea, tachypnea, and cardiac arrhythmias after ingestion of the seeds of the plant *Erythrophleum succirubrum*, Gagnep. Two children died of cardiac arrest. Although the leaves of some species of the genus *Erythrophleum* have caused fatal poisonings of large numbers of livestock in Madagascar, the Seychelles Islands, and Nigeria, similar outbreaks of poisonings in children are rarely reported (Thorp, and Cobbin, 1967; Hauth, 1974; Nwude, 1982).

### Description of outbreak

On November 28, 1985, 27 Khmer refugee children between 4 and 7 years of age were admitted to Dong Ruk health center, Prachinburi, Thailand, approximately 6 hours after ingesting 1-4 beans found in pods on plants that were used for decoration at a wedding. The beans had a cinnamon taste and induced vomiting shortly after ingestion in many of the children. These children vomited, were hyperpyrexia, and had marked bradycardia associated with extrasystoles. Two children died at Dong Ruk of cardiac arrest. Following these deaths, 17 of the

remaining 25 children were transferred to the hospital at Khao I Dang refugee center approximately 12 hours after ingestion of the beans. Among these 17 children, 14 vomited, 4 had diarrhea, and 4 had weakness on arrival at Khao I Dang. During the next 6 hours, 14 of the 17 children had an irregular pulse, but none had a pulse rate of less than 50/min. Systolic blood pressure of greater than 140 mmHg were recorded in 5 children, and of less than 90 mmHg in 5 others. Five children had a fever of between 38-39°C and 12 had mild, non-bloody diarrhea. All children were alert and well hydrated; none were malnourished. They were treated with gastric lavage, intravenous infusion of 5% dextrose, and subcutaneous atropine. Within 24 hours all had recovered and had regular pulses. Two children admitted with severe bradycardia and vomiting died of cardiac arrest at Dong Ruk two weeks earlier after ingestion of similar seeds. The plant was identified as *Erythrophleum succirubrum* Gagnep.

## DISCUSSION

Children living in rural villages in the tropics have ample opportunities for accidental poisoning with toxic berries, fruits and vegetables. Fatal intoxications have occurred with the ackee nut (*Blighia sapida*) in Jamaica, bitter casava (*Manihot utilissima*) in West Africa, various species of *Datura* in many

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tropical countries, and the physic nut (*Jatropha glandulifera*) in the West Indies (Schram, 1978).

The genus *Erythrophleum*, which belongs to the family Leguminosae, comprises many species which are found in Africa, Australia, and Southeast Asia (Hauth, 1974). *E. succirubrum* Gagnep called "saat" or "phan saat" by Thais and "tria" by Khmers grows throughout northeastern Thailand and Kampuchea (Aksornkoae, 1971; Sattayasai *et al.*, 1983). The leaves of this plant are used by villagers in northeastern Thailand to treat skin diseases and there are anecdotal reports of deaths occurring after ingestion of the leaves. A report of poisonings similar to those reported here was received by the Herb Data Center of the Ministry of Public Health from Amphur Krasang in Buriram in 1983 (pers. commun.). Four children, approximately 10 years of age, ate 2-3 seeds of the plant *E. succirubrum* Gagnep. The next morning (12 hours later) the children were semi-conscious, had shortness of breath, irregular pulses, and pinpoint pupils when admitted to the hospital. One child died within minutes of admission and three others recovered after receiving supportive care.

The bark, root, leaves, and seeds of plants of the genus *Erythrophleum* contain alkaloids with digitalis-like effects (Thorp and Cobbin, 1967; Hauth, 1974). These alkaloids have been reported to cause paralysis of the respiratory center, dyspnea, salivation, bloody diarrhea, trembling, thirst, headache and visual and sensory disturbances in animals. Cardiac and respiratory paralysis may lead to death (Thorp and Cobbin, 1967; Nwude and Chineme, 1981; Nwude, 1982; Sattayasai *et al.*, 1983).

In 1876 an *Erythrophleum* alkaloid was first isolated from the bark of *E. guineense*,

a tree widely distributed in equatorial forests of West Africa, where its bark was used as an arrow poison (Thorp and Cobbin, 1967). In 1935 the alkaloids casaine, cassaidine, and norcassaidine which resemble cardiac glycosides were purified in crystalline form from *E. couminga* (Thorp and Cobbin, 1967). Alkaloids of *Erythrophleum* species act by affecting the balance of cation transport in cardiac muscle (Thorp and Cobbin, 1967; Hauth, 1974). In dogs and cats all *Erythrophleum* alkaloids have a positive inotropic effect and at slightly higher doses cause cardiac irregularities. In cats they cause nausea, vomiting, and cardiac arrest (Thorp and Cobbin, 1967). Sattayasai *et al.*, (1983) studied the toxicity and pharmacological properties of *E. succirubrum* Gagnep leaves in experimental animals. The LD<sub>50</sub> of aqueous extracts of the leaves given intraperitoneally to mice was 20 g/kg body weight. At a dose of 10 g/kg mice became tremulous, weak, and had difficulty breathing. At higher doses mice became hyperreflexic and had tonic-clonic seizures with spastic paralysis. The leaf extract given intravenously to anesthetized rats produced an increase in blood pressure and a decrease in heart rate. At higher doses A-V block was observed. The extract had a positive inotropic effect on rat heart lung preparations (Sattayasai *et al.*, 1983).

Treatment of children poisoned by plants containing digitalis-like alkaloids is difficult, especially in situation without ready access to electrocardiograms. Luckily this plant also contains a potent emetic and most children who ingest these seeds vomit them before the alkaloids are absorbed. Physicians in the tropics should be aware that seeds or leaves of *Erythrophleum* species can contain digitalis-like alkaloids and ingestion of these seeds can cause fatal epidemics of poisoning in children as well as in livestock.

## SUMMARY

Twenty-seven Khmer children at a refugee camp in Thailand developed vomiting and diarrhea after ingestion of the seeds of the plant *Erythrophleum succirubrum* Gagnep. Two children died of cardiac arrest. Ingestion of seed of *Erythrophleum* species that contain digitalis-like alkaloids causes fatal epidemics of poisoning in children as well as livestock.

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