the male brolgas twice a week in an attempt to collect a semen sample (both the male of the breeding pair and a single male were utilised for this purpose). We were extremely pleased when we were successful after only a few attempts. The birds soon got used to being handled and were certainly not averse to the attention. We also began handling the female as the breeding season drew nearer.

The pair laid two eggs in early January. These were removed to the incubator in case they were actually fertile this time. We then commenced inseminating the female every couple of days, if possible (the males didn't always cooperate). This was a three-person operation as our rather aggressive breeding male had to be held back whilst the female was being handled. Everyone had a role to play – the 'guard', the 'handler' and the 'inseminator'.

The female laid the first of a second clutch slightly earlier than expected, followed by a second egg a few days later. The parents sat on those precious eggs through some wild weather, which included several thunderstorms. After a pretty nerve-racking incubation period (for the staff, anyway), the first chick hatched on 25 February, followed by the second on the 28th. The size difference was marked and the second chick was forced to become independent quite quickly, as the parents paid considerably more attention to the larger of their offspring from the outset. In future, it would be preferable to replace the first egg with a fake until the second egg was laid. This would eliminate the risks associated with having one chick a few days younger than the other.

Olivia King in *ARAZPA Newsletter* No. 62 (May 2004)

Cincinnati Zoo, Ohio, U.S.A.

The zoo is proud to announce that on 30 July Emi, the Sumatran rhinoceros, delivered a healthy female calf, becoming the first of her species in history to produce two calves in captivity. 'This is a historic birth. It is proof that the science of breeding Sumatran rhinos has been developed at Cincinnati Zoo and the first birth was not a one-time wonder,' said Dr Terri Roth, Vice President of Animal Sciences.

In September 2001, Emi gave birth to a healthy male calf named Andalas. This was the first time in 112 years that a Sumatran rhino successfully reproduced in captivity. Emi and Cincinnati's male, Ipuh, are on loan from the Indonesian government and are the only successfully breeding captive pair in the world. Only two other Sumatran rhinos are in the United States: Andalas is currently at Los Angeles Zoo and a fourth rhino, an older female, is at the Bronx Zoo.

Cincinnati Zoo's successful breeding program has clearly demonstrated the value of science in breeding endangered species. Scientists at CREW, the zoo's Center for Conservation and Research of Endangered Wildlife, have achieved their ultimate goal. The successful, natural reproduction of two Sumatran rhinos validates the science developed at CREW and shows the work is repeatable.

Sumatran rhinos are one of the most difficult species to breed and maintain in captivity. Initially the greatest challenge was to get the male and female together for mating. These solitary forest animals do not tolerate each other's company except during a short period when the female is receptive to the male. Since Sumatran rhinos show no changes in behavior to indicate when mating should take place, serial ultrasound exams and hormone monitoring were used to unravel the mysteries of their reproductive cycle.

'One of the greatest surprises and a finding key to understanding how to breed this species was the discovery that this is an induced ovulator, with females only ovulating following mating,' says Roth. 'This characteristic is unique to the Sumatran species.' Over time, CREW researchers determined that the female

Cincinnati Zoo's new Sumatran rhino calf. (Photo: Dave Jenike)

Sumatran rhino's reproductive cycle is 21 days in length if she is mating and ovulating regularly. If the female is not mated by the male, her cycle becomes irregular and scientists must rely on ovarian follicle size (based on ultrasound) and progesterone concentrations (measured in blood samples) to determine receptivity. Because the female's estrus lasts only 24–36 hours, there is not much room for error in pin-pointing the day of mating.

After using scientific data to safely time mating, an unexpected problem arose. Emi developed a pattern of becoming pregnant and losing the pregnancy within the first 90 days of gestation. After losing five pregnancies between 1997 and 2000, it was clear something else had to be done. During a Sumatran rhino master plan meeting in Malaysia in 2000 it was agreed that Emi should be administered a hormone supplement during her next pregnancy. When she became pregnant for the sixth time, a daily dose of oral progesterone, a product commonly used in horses, was prescribed. Emi carried her sixth pregnancy to term and delivered a healthy calf after a 475-day gestation.

After she weaned Andalas in 2002, ultrasound monitoring of Emi resumed, and she conceived following the sixth mating on 10 April 2003. In the hope that after one full-term pregnancy she would be able to carry to term without the supplemental hormone, the progesterone supplement was not prescribed, and Emi's second calf was born following a natural pregnancy.

Abridged from Cincinnati Zoo press releases

Edinburgh Zoo, U.K.

On 25 August Siger, our last giraffe, set out for Givskud Zoo, Denmark, to continue his participation in the Rothschild's giraffe EEP; interestingly, he will be the