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Introduction

ORIGINS OF JAPANESE PRIMATOLOGY AND KINJI IMANISHI

My first mentor, Kinji Imanishi (1902–1992), was the founder of Japanese primatology. He was a bio-social anthropologist as well as ecologist, zoologist, entomologist, Himalayan mountaineer, explorer, and philosopher. His primary interest was the structure of the biological world, including human society (Imanishi 2002; Japanese original published in 1941).

From 1932 to 1942 he made several geographical and anthropological expeditions to Sakhalin, northern Korea, Mongolia, and northeastern China. From 1944 to 1945 he established the Seihoku (Northwestern) Research Institute at Choukakou and studied the ecology of pastoralists and their livestock in Mongolia. He returned to Japan at 1946 after the end of the Second World War in 1945 (Saitoh 1989). Finding no funds to conduct research outside of Japan, he began a study of the society of free-ranging horses indigenous to Japan at Toimisaki Point, Miyazaki Prefecture, in 1948. He identified and named each horse and investigated grouping patterns and social interactions among them.

One day in November 1948, when Imanishi's students, Shunzo Kawamura (1924–1999) and Junichiro Itani (1926–2001), were observing horses, they noticed that wild Japanese macaques in the distance were travelling in a neat procession. The beautiful line created by the monkeys' procession impressed them. After a month, Imanishi and the students visited Kohshima Island to look into the possibility of studying Japanese macaques. After this survey, Imanishi decided they should begin to observe macaques, leaving behind the horse research (Nishida 2009). Of course, he had already read Carpenter's pioneering

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primate studies,[1] and could predict that an investigation of monkeys would be interesting. Fortune knocks on the door of the person who is prepared for it.

Imanishi and his students successfully conducted research on the ecology, social structure, and behaviour of Japanese macaques through the methods of provisioning, individual identification, long-term research, and observation of many troops throughout Japan (Frisch 1959). During the macaque studies, Imanishi's interest was directed more to biological anthropology, as well as to comparative animal sociology, and in 1951 he wrote a book titled *Prehuman Societies*.

QUEST FOR THE MISSING LINK

In 1958 Imanishi organised the Japan Monkey Centre Gorilla Expedition, sponsored by the Nagoya Railway Company. The purpose of this research was to investigate the origin of the human family (Imanishi 1958a).

There are four types of great ape: chimpanzee, bonobo (bilia or pygmy chimpanzee), gorilla, and orangutan. These creatures are the closest living relatives to humanity. According to the traditional taxonomic nomenclature, they belonged to the same superfamily as humans (Hominoidea), but were classified into a different family, Pongidae, with only humans belonging to Hominidae.

Which ape should be selected for the research? Imanishi first considered orangutans because they were least known to the academic world. These Asian great apes intrigued Imanishi, who was always thinking of the 'first ascent' as an alpinist. However, he did not pursue this idea because, due to their arboreal habits, orangutans would be difficult to habituate through provisioning. Among African apes, virtually nothing was known at that time about the pygmy chimpanzees.

Gorillas were selected as Imanishi's first target, as he knew where they could be found and because gorillas were more terrestrial than chimpanzees. Hence he thought gorillas would be easier to habituate by provisioning than chimpanzees. On the basis of short preliminary surveys by two young women, Rosalind Osborn (in 1956–1957) working under the supervision of Louis Leakey, and Jill Donisthorpe working under the supervision of Raymond Dart (in 1957) (Sussman 2007), Imanishi reasoned that gorillas, and probably great apes in general, formed 'familoid' groups. He considered these to be a social unit of the

[1] See Carpenter (1964) for an anthology of his primate studies.

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'species society'. On the other hand, from the ethnographic and cultural anthropological literature, he extracted the key factors that were common to human families worldwide. These are: (1) incest taboo; (2) exogamy; (3) division of labour between the sexes; and (4) existence of a 'community'. By 'community' he meant that social units do not exist independently but are integrated into a higher unit (Imanishi 1958b). This is the reason that I do not use the term 'community' for the social unit of chimpanzees or bonobos. Instead, I employ it in the manner Imanishi originally intended. Prior research suggested that gorillas had a family-like social unit, i.e. one male–multi-female group, but the relationships between social units were unknown.

The gorilla expedition lasted for three years (1958–1960) and clarified the social structure of the gorillas to some extent, but the political instability in what was then the Belgian Congo prevented the continuation of research. At the same time, George Schaller was initiating another study of gorillas in the Virunga Volcanoes region, which was to lead to Dian Fossey's well-known research there. Given these events, Imanishi changed his target of study from gorillas to chimpanzees. He apparently thought that both possessed a similar social structure, and that they would be interchangeable for research purposes. Gorillas and chimpanzees were believed to be sister species and equally related to humans at that time, and as a consequence, they were considered together to be our closest living relatives.

The start of the first Japanese ape expeditions coincided with a great wave of international interest in the great apes living in their natural environment. In the late 1950s, Adriaan Kortlandt (1962) started his research on chimpanzees at Beni in the Congo, while George Schaller (1963) started his mountain gorilla study in the Virungas. In 1960 Jane Goodall (1963) began her long-term study of chimpanzees at Gombe, Tanzania, and in 1963 Vernon Reynolds (Reynolds & Reynolds 1965) followed suit in the Budongo Forest, Uganda.

NO FAMILOID EXISTS

After the gorilla expedition, in 1961 Kinji Imanishi organised the first Kyoto University African Primate Expedition (KUAPE). He collected funds from many private companies, as well as from the Japanese Ministry of Education, Science, and Culture. He was allowed by the Vice-Chancellor to use Kyoto University for tax-free donations for

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overseas scientific research. From his experiences of alpine climbing and expeditions, he was an expert organiser.

I joined the Kyoto research team in 1965. When I did not find a 'familoid' system in chimpanzee society after successfully provisioning them in 1966 (see below), I reported this important information to Dr Itani, who had just arrived at Kigoma, Tanzania, from Japan. Itani was my second mentor after Dr Imanishi's retirement from Kyoto University in March 1965.

By 1970 I had concluded that chimpanzees have a unit-group as the social unit, which is a multi-male, multi-female group ranging from about 27 to 80 in size, and which usually splits up into temporary subgroups or parties. I also had discovered that relationships between unit-groups are antagonistic, that adult males are the core of the unit-group. Males are bonded with each other more closely than to members of any other age or sex class, and females, not males, transfer to other unit-groups (Nishida 1968; Nishida & Kawanaka 1972).

These social and behavioural characteristics differed remarkably from those of gorillas (Schaller 1963; Fossey 1970). This caused me immense difficulty when attempting to reconstruct the evolution of the human family. I was at a loss as to how to reconstruct the society of the last common ancestor (LCA), given the radically different social structures of chimpanzees and gorillas. At the time, these two species were believed to be equally related to humans, and it appeared impossible to unravel how human behaviour emerged from these two very different patterns.

After joining the Department of Anthropology at the University of Tokyo in 1969, I felt obliged to use the study of chimpanzees to ask questions about human origins. As I continued to struggle with these problems, two lines of new evidence emerged. The first involved my work with the pygmy chimpanzee's social structure. In February 1972 I did preliminary research on pygmy chimpanzees around the Lac Tumba region of the Equatorial region of Zaire (Nishida 1972a). The next year Takayoshi Kano and I visited the Salonga National Park, but we could not find a good site for a long-term study. Kano continued this general survey. He found and established a permanent field station at Wamba (Kano 1979), after travelling 2000 km around the country on a bicycle. Kano and his colleagues discovered that the bonobo's social structure is generally similar to that of the chimpanzee. Both live in multi-male, multi-female social units; unit-groups avoid each another; and females, not males, disperse from natal groups at adolescence. Despite these similarities, the two species

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also display some important social differences (Kano 1980; Kuroda 1979, 1980), such as female dominance over males in some contexts, but the similarity in social structure between them was confirmed. It was important to know that the phylogenetically closest species share a similar social structure. This finding was necessary to reconstruct the evolution of human society.

A second major discovery also helped to clarify matters. Morris Goodman had asserted as early as 1960 that the African apes were more closely related to man than were orangutans (Goodman 1961). His assertion was based on immunological comparisons between humans and apes, and he concluded that humans must be classed with African great apes and apart from Asian orangutans. However, after coming to this conclusion, we still had no idea about how to resolve the trichotomy between human, chimpanzee, and gorilla (Fig. I.1). The results from molecular genetic research were confusing, with some studies showing that gorillas were closer relatives to man than chimpanzees, while others suggested the opposite. Based on my observations, I became convinced that chimpanzees were humanity's closest living relatives. This conviction was validated by later research comparing the DNA of humans, chimpanzees, and gorillas, which showed that chimpanzees and bonobos (genus *Pan*) are more closely related to us than are gorillas

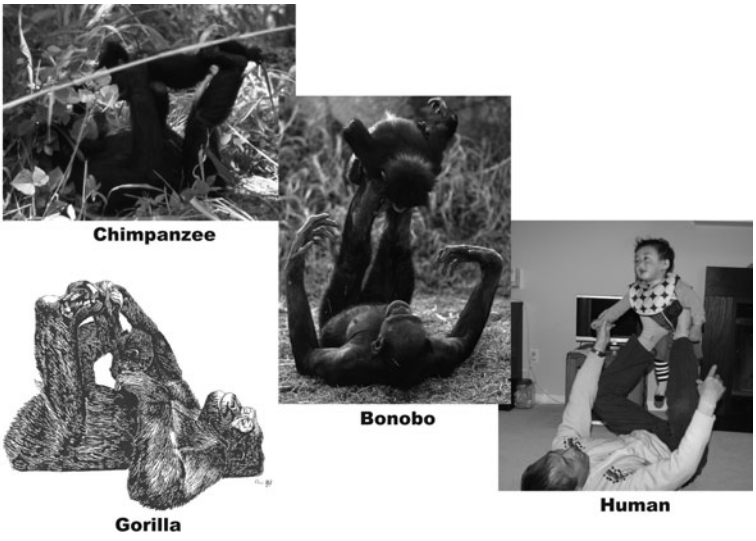

Fig. I.1 All African apes perform the 'aeroplane' pattern.

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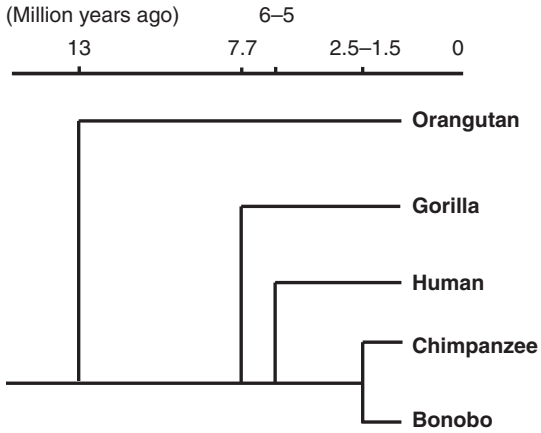

Fig. I.2 Phylogeny of great apes (adapted from Horai *et al*. 1992).

(Fig. I.2) (Horai *et al*. 1992). This success of molecular taxonomy helped to revive my interest in attempting to reconstruct the evolution of human behaviour, a programme of study that I had almost abandoned.

Humans are more similar to chimpanzees than gorillas in many behavioural ways: adult males bond with one another; females rather than males leave their natal groups (patrilocality); both use tools in a variety of contexts; both hunt mammals and eat meat. Furthermore, sex differences in body size in humans and in chimpanzees are relatively small. In sum, behavioural differences support the molecular evidence. Adriaan Kortlandt (1962) had anticipated these findings when he asserted that chimpanzees were human's closest living relatives, long before the evidence from the molecular taxonomy firmly established this fact.

Thus, the results of research on hominoid evolutionary relationships and behaviour began to converge in the mid-1980s. Our ability to reconstruct the behaviour of our ancestors was revived and has prospered. Based on current data, it is likely that the LCA of humans and the genus *Pan* were omnivores, lived in multi-male social units with female transfer, and had antagonistic intergroup relationships. Now I will tell you the story of my exploration into the hinterland of Lake Tanganyika and how I watched chimpanzees.

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1

At the beginning

1.1 LAKE AND FOREST

1.1.1 Breath-taking sunsets over Lake Tanganyika

Lake Tanganyika is a long lake that forms a link with the Western Rift Valley of Africa, starting from the Red Sea and ranging from Lake Kivu and Lake Albert to the north, Lake Malawi to the south, finally pouring into the Indian Ocean at Mozambique (Fig. 1.1). With a maximum depth of 1470 m, it is the second deepest lake in the world, after Lake Baikal in Siberia.

Tanganyika is the seventh largest lake in the world, with an area of 32 000 km^2. It hosts both freshwater and saltwater fish. The saltwater fish include four species of sardine called '*dagaa*'. On nights when the moon is new, you can see men rowing along the water holding high-pressure kerosene lamps called *karabai*, scooping up dagaa with massive ladle-like nets. Or in the late afternoon, you can see fishermen in schooners dragging nets across the lake's surface. Trapped dagaa are dried in the sun on the sandy beach and sent to the markets of Kigoma, after being packed in sisal bags.

There are several species of mammal and large reptile, such as otter, hippopotamus, and Nile crocodile, living in the lake. In the reeds by the lakeshore, one can find the African darter roosting. Pied kingfishers put on diving shows, while giant kingfishers, African fish eagles, and bee-eaters perch on nearby boughs.

The lake itself is usually transparent, but occasionally during the rainy season, on the night after a storm subsides, the surface of the lake turns a solid green. If you scoop up some water in a bucket, it is filled with algae and jellyfish. Around March, whirlwinds rise up from the lake. At times, you may see four or five magnificent funnels at once. The sunsets at Lake Tanganyika should be seen in the rainy

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Fig. 1.1 Map of Tanzania.

season; ranging from light orange to crimson violet to scarlet, they are some of the most spectacular in the world.

1.1.2 The chimpanzee forest

The Mahale Mountains are on the eastern shore of Lake Tanganyika, 135 km south of the town of Kigoma (Fig. 1.2). The lake is the region's sole thoroughfare. The nearest roads, which are difficult to travel, are 60–150 km east of the lakeshore, running north from Uvinza and south to Mpanda (Fig. 1.3). From Kigoma, as you move southward along the lake by boat, you see a range of gently sloping hills on the eastern shore. About midway a large peninsula juts out. This is where Kyoto University's first base camp was, at Kabogo Point. A hot spot for sardine fishing, the fishermen's fires dot the shores at night,

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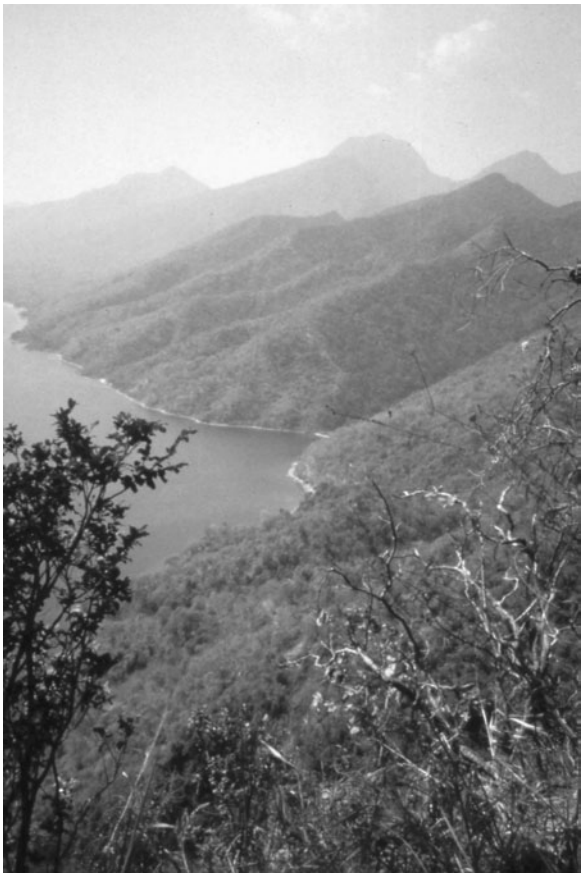

Fig. 1.2 Mahale Mountains viewed from the south.

creating an enchanting scene. After the smooth rolling of the hills ceases, you see steep mountains. The northern entrance of the Mahale Mountains National Park is close by.

The Mahale Mountains is one of the world's most spectacular places, with several huge peaks and steep slopes with montane and middle-altitude forests. They are isolated about 200 km from the northern highlands of Burundi-Rwanda and 300 km from the southern highlands of Tanzania. The region is home to several endemic forms of mammals, reptiles, amphibians, insects, and plants.

Western Tanzania is covered mostly with *miombo* woodland (dry forest), which is made up mainly of deciduous trees of the family Leguminosae (Fig. 1.4). Riversides are typically lined with semi-evergreen forest. However, Mahale is over 2500 m at its highest peaks and stretches

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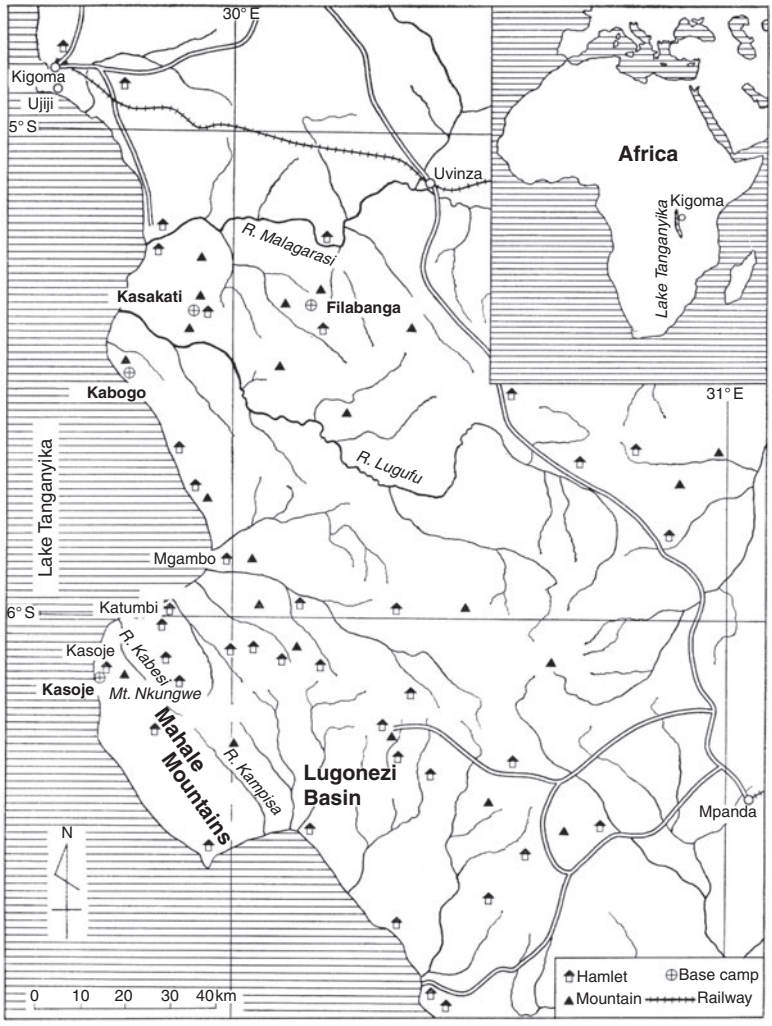

Fig. 1.3 Western Tanzania, including Gombe, Kigoma, Malagarasi, Ugalla and Mahale (adapted from Nishida 1990b).

along the lake from north to south for 80 km. Consequently, a unique vegetation produced by high rainfall and damp air from the lake has developed on the west side of the Mahale Mountains. Annual rainfall ranges from 1700 mm to 2200 mm at the Kansyana camp.[1] I named this tropical, semi-evergreen forest 'Kasoje forest' (Fig. 1.5). Few huge trees

[1] See Nishida & Uehara (1981) for the vegetation, and see Nishida (1990a) for general landscape and climate of Mahale.

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