ABSTRACT. This research investigated the sources of explanations and understanding of natural phenomena in terms of the students’ cultural and school science experiences. The first phase involved interviews with eight village elders that probed their explanations and understanding of natural phenomena. The second phase involved the design, development and administration of two questionnaires on natural phenomena to 179 students in a rural boarding high school in Papua New Guinea (PNG). Most village elders gave explanations of many of the phenomena in terms of spirits, spells, magic, religion, and personal experiences. Most school-aged students choose scientific explanations of natural phenomena in terms of what they had learned in school or from personal experiences. However, many choose explanations of the same phenomena about spirits, spells and magic that came from the village, family or home. The study revealed that students’ ideas about natural phenomena are strongly governed and controlled by their school science knowledge in the school setting. It is likely that their own traditional knowledge cannot be identified in a school setting but that questionnaires in the students’ local language be given to students in their villages (as opposed to school). In addition, so as not to diminish the value of this traditional knowledge, science education programs are needed that are able to consider and harmonise traditional knowledge with school science.

KEY WORDS: learning science, scientific explanations, traditional knowledge

Papua New Guinea, situated north of Australia, is a culturally diverse developing country with a population of 4.5 million Melanesians. The people speak over 715 different languages and belong to many different cultural tribes (Central Intelligence Agency, 2004). The tribal clans view nature as a whole; continuity from the past to the present and into the future; the clans are linked with the surrounding land, water forests, and heavens (Waiko & Jiregari, 1982). The wisdom and accumulated tools for dealing with and living in the environment are contained in this knowledge base which is learned by repetition, reinforced rituals, sanctions on the ancestors, or rewards from the spirits. For example, Kiki (1963) in his autobiography ‘Kiki Ten Thousand Years in a Lifetime’ confirms that his mother’s people referred to the dead as ‘going to the west’ because their dead were not buried in the ground but placed high up in tree branches facing the sunset. The people did not believe in the last judgement and had no concept of heaven or hell. But they believed that the dead were ever
present and they can be called upon to help in any dangerous situation. Similarly the ‘Toaripi’ of the Gulf Province referred to their dead ancestors to a dwelling place of the dead called ‘alaua-ipi kivokipi’ which connotes a place beyond the western horizon where spirits of the dead were supposed to dwell. Thus the exclamation ‘alaua-ipi meaforoe a’ is often said where there is a beautiful sunset, ‘what lovely weather in the spirit land’ (Brown, 1968). Thus, Australia is referred to as the spirit land where the dead were supposed to dwell.

Village elders from many tribal groupings are perceived to be the source of wisdom and the recognised authority of tribal knowledge (Waldrip & Taylor, 1999b). In many PNG traditional societies, traditional knowledge is finite and passed down from generation to generation by word of mouth by the older members to the younger generation of the tribe as a survival tactic. Such knowledge includes the skills of hunting, trading expeditions, building canoes, gardening (planting and harvesting), building shelter, healing diseases, forecasting weather, initiation ceremonies, funeral rites, protection against crocodile, fishing expeditions, and various activities associated with cultural heroes. The most respected elder in a community usually conducted the teaching and learning that occurred through practical absorption (observation) and participatory activity embedded in each villager’s daily life. Specialists teach the tasks to a selected few who have gone through the primary and secondary streaming processes by way of pre-initiation (Kelontii, 1996). Pre-initiation is mainly done through observing the child’s interests at an early age. For example, if a child is found to possess aggressive behaviour, he is singled out and given a warrior’s initiation.

Traditional knowledge comes from a wide diversity of experience in nature, from teaching and apprenticeship, working with the land, by absorbing the feel of the wild animals and plants, and by listening to legends and stories (Emery & Patton, 1997). Therefore traditional knowledge is organised and based on integration, not on analysis into parts. In addition, basic assumptions about classification of plants and animals or cultural actions and rituals are often very different to those of technology-based societies. The characteristics of traditional learning are through observation, imitation, and verbal instruction; by personal trial and error through demonstrations; mostly with real life activities; and being context specific and person oriented (Harris, 1992). In many villages, learning of indigenous languages, folklore, personal-social relationships, traditional vacations and dances and the nature of family structures, still depend heavily on these procedures and experiences from the past. During puberty,