

operation, with the traps turned around to face downstream.⁶⁰ It was a well-organised and highly efficient system of mass food production.

On some Canterbury streams near Kaiapoi and Temuka, pa kanakana weirs and traps were built to take lamprey (*Geotria australis*) during their spring migration.⁶¹ Grayling, now extinct, and many species of small estuarine and riverine fish, including native trout, were regularly caught in nets, traps, trenches dug into stream banks and by other kinds of devices, mostly during the summer months. Closely woven kaka nets were staked across streams to catch small fish and, with the net doubled, to take whitebait.

Fowling

Muttonbirding for sooty shearwaters, or titi (*Puffinus griseus*), occurred on Banks Peninsula and Motunau Island, and occasionally in the low cliffs along the Canterbury Bight, but it was a comparatively minor industry in the region. Instead, Canterbury Ngai Tahu exercised their hapu (clan) rights to join in the autumn muttonbirding on islands in Foveaux Strait, the produce of which formed an important item of trade (see page 85).

Weka were particularly important to Canterbury Maori, who hunted them in winter on the inland plains and the Mackenzie Country, often using dogs, which were also used to hunt moulting ducks in summer. Another method was to use people in canoes to drive large numbers of moulting ducks – grey duck, scaup (*Aythya novaeseelandiae*), brown duck (*Anas chlorotis*), grey teal (*Anas gracilis*) and paradise shelducks – into fence traps around the shallows at Waihora.⁶² Each kaika (village) facing Waihora made fences (taiepa) into the lake, something like sheep yards, and the birds were driven into these enclosures (raihe) and the gate was shut.

They could also be caught by hand, as described by Bishop Selwyn in January 1844 near Timaru. His guides saw paradise shelducks in moult on a small lagoon:

The natives immediately threw off their blankets and rushed into the water, which was shallow and about a furlong in length. After an animated chase of two hours . . . they captured eighteen, which formed a seasonable supply of food in this thinly inhabited country.⁶³

Forest birds were taken in various ways, including by the use of snares and bird spears. Hunting of pigeon (*Hemiphaga novaeseelandiae*), kaka, tui and bellbird (*Anthornis melanura*) began in January and February, with snares set at water troughs. In the berry season (April to June) birds were snared or clubbed and in July were shaken out of wet foliage when their feathers were soaked. Forest fowling ended about August. The catches were cooked and preserved in fat, often packaged into totara-bark baskets. Collecting birds' eggs, especially those of the black-backed gull, or karoro (*Larus dominicanus*), from the braided riverbeds of Canterbury was a common task.⁶⁴ Another protein source was the kiore, snared in beech forests from April to July.⁶⁵

Vegetable foods

The sweet potato, or kumara (*Ipomoea batatas*), was cultivated in Canterbury to about the latitude of Taumutu, and the gourd (*Lagenaria siceraria*) was said to have been grown on Banks Peninsula.⁶⁶ Gardening is marked by

archaeological remains of field boundaries, garden walls, storage pits and similar structures, especially on Banks Peninsula. By the 1830s the introduced white potato (*Solanum tuberosum*) was grown more commonly throughout Canterbury, but kumara was still cultivated at Kaiapoi.

The root of the bracken fern was a common dietary item. Dug, roasted and beaten to separate the gritty starch from its attachment to long fibres, it was appreciated for its ability to appease hunger and its availability to travellers.⁶⁷ It could be mixed into a pudding with tutu juice, shark oil, whitebait or any other flavouring. Tutu berries were crushed and strained to separate the juice from the poisonous seeds. The juice could be added to many other foods, including to kelp to make a jelly. The rising of the star Rehua (Antares) signified the beginning of summer and it was said to 'cook' the sweet tutu berries and korari (flax flower) juice. The snowberry, or taupuku (*Gaultheria* spp.), was a particular alpine delicacy, and many other berries were eaten: rohutū (*Lophomyrtus obcordata*), matai (*Prumnopitys taxifolia*), mikimiki (*Coprosma* or *Cyathodes* spp.), konini (*Fuchsia* spp.), titoki (*Alectryon excelsus*), hinau (*Elaeocarpus dentatus*), plus the kernels of processed karaka (*Corynocarpus laevigatus*) berries. Miro (*Prumnopitys ferruginea*) and titoki berries were pounded to extract oil.⁶⁸

Undoubtedly the most important vegetable food in Canterbury came from the ti kouka, whanake, or cabbage tree, which produced kauru. Only young trees, up to about two metres in height, were used, the carrot-shaped 80 cm root and lower stem being taken:

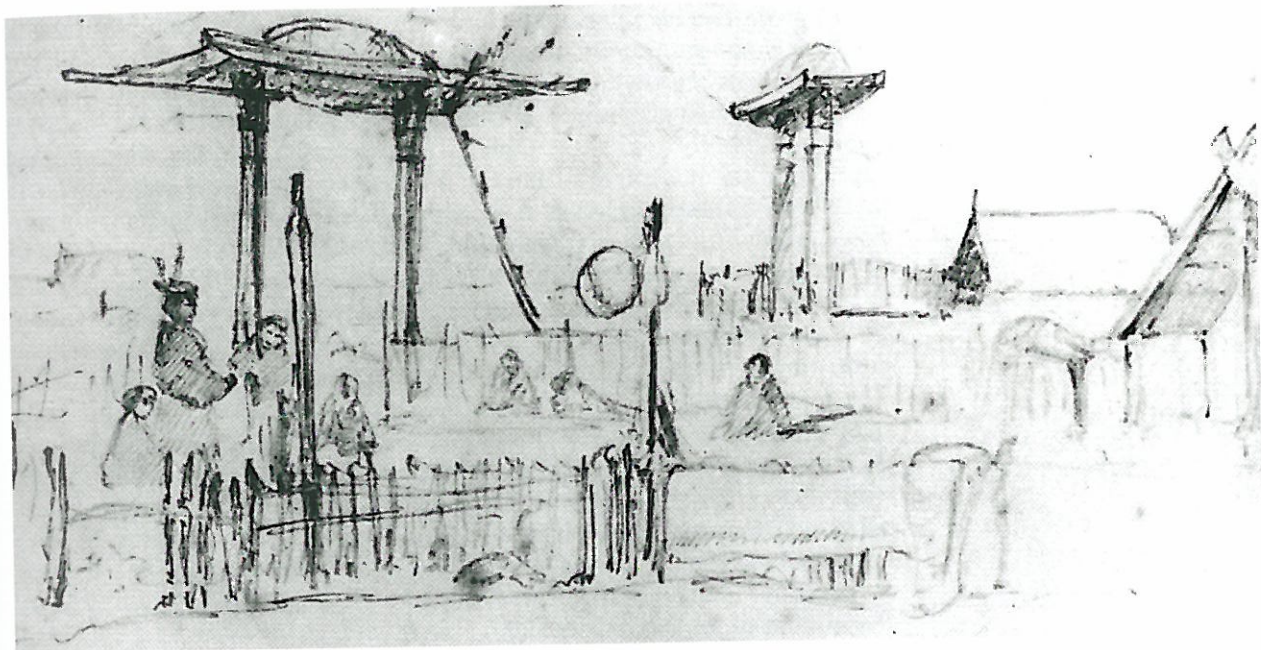
The natives have learned to dig it at the season when it contains the greatest quantity of saccharine matter; that is, just before the flowering of the plant. They then bake or rather steam it in their ovens. On cooling, the sugar is partly crystallised, and is found mixed with other matter between the fibres of the root, which are easily separated by tearing them asunder, and are then dipped in water and chewed.⁶⁹

The kauru season began in October. After a ceremony involving karakia (prayer) and cooking of the ti kouka shoot base, the first cutting was from October to December. A second cutting occurred in the autumn, when garden tasks ceased. The cuttings were stored on whata (storage platforms, Figure 5) to dry, near the place where they were cut, and also cooked nearby in large ovens for about 36 hours. The kauru sugar could be washed out of the fibres and evaporated to a kind of toffee, or the soft pith reduced to a sweet porridge. Mixed with mashed fern root, it had a similar taste and consistency to gingerbread. Kauru was produced mainly in South Canterbury by the 1840s and *Cordyline* growth was encouraged by cutting and burning in the vicinity of settlements.

Industrial resources

The range of lithic resources that had been in use for hundreds of years continued to be used during the late phase, but pounamu became a major source of wealth, and the implements fashioned from it – adzes, mere, hei matau, hei tiki and other forms of weapons and ornaments – were traded throughout New Zealand and largely define Classic Maori material culture. Kaiapoi was a major centre of pounamu working, using material carried over the Southern Alps from central Westland. It was pounamu that attracted Ngati Toa's attention and led to the destruction of Kaiapoi in 1831.

Many kinds of timber were used traditionally, notably totara (*Podocarpus*



totara) for major items such as houses and canoes, and *kanuka* (*Kunzea ericoides*) for fences, which were often bound together with supplejack vines (*Ripogonum scandens*). Hardwoods, such as *manuka* (*Leptospermum scoparium*), *koai* (kowhai, *Sophora* spp.) and *akeake* (*Dodonaea viscosa*) were used for digging tools, weapons and bowls; *kaikomako* (*Pennantia corymbosa*), for fire ploughs, and bundles of thinly split *kahikatea* (*Podocarpus dacrydioides*), *manuka* or supplejack for torches. *Raupo* stems were used to make kites. *Koai*, *karamu* (*Coprosma* spp.) and *koromiko* (*Hebe* spp.) bark, as well as flax root, were used to cure diarrhoea, and *puha* (*Sonchus* spp.) juice was rubbed on spider bites.⁷⁰

The clays of Banks Peninsula provided blue dye and red ochre for houses, canoes and people. Bark from *pokaka* (*Elaeocarpus* spp.) and *beech* (*Nothofagus* spp.) provided black dye, and yellow dye came from *karamu* (*Coprosma* spp.). Flax (*harakeke*) was all-important for rope and twine, and it also provided fibre for weaving into baskets and clothes. The standard garment was a cape, worn by men and women:

It had no collar, and was tied with strings sewn to each end of the neckline. Its texture was tight, and made waterproof thanks mostly to long-pile shag, twelve to fifteen centimetres in length. When the coat was new and the flax at its shiniest, it had a certain lustre . . . most often it was very muddy and gave off an offensive smell. A grass skirt was worn around the hips under the coat . . .⁷¹

Sandals were often made from the leaves of flax or *ti*: '[T]he latter are preferable, being much the toughest . . . a pair with double soles, called "torua", [were] calculated to endure several days' walk along a beach, which is so destructive to shoes.'⁷² *Ti* leaves, flax or tussock were also used to make rain capes (*pokeka*). A *tapa* cloth made from the inner bark of ribbonwood (*Plagianthus* spp.) was used for loincloths and sewn with *ti* fibre into sails. *Pikao* (*pingao*) grass (*Desmoschoenus spiralis*) was woven into leggings and chest guards for warfare.⁷³

FIG. 5 An 1848 sketch of Waiateruati village, South Canterbury, by Walter Mantell. The elevated structures are whata (storage platforms for dried food).

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Another fibre much valued by Ngai Tahu came from the leaf of the mountain daisy, tikumu. It was woven into the body of flax cloaks to produce a snow-white garment, highly prized in the North Island. The Canterbury high country also produced a perfumed resin, taramea, which was another important item of exchange. Other scents came from tarata (*Pittosporum* spp.) resin, or the leaves of hakeke (*Olearia* spp.). Totara bark, which is thick, waterproof, tough and flexible, was used extensively for many purposes, including shelters, umbrellas and baskets.⁷⁴ Flax flower stalks and dried reeds were used to make boats, called mokihi, for lake and river use (see page 84).

Land tenure and resource management

The exploitation of these various and dispersed resources by a population of low density (probably about one person per 25 km² at the beginning of the 19th century,⁷⁵ based on a total population of 2,000 in Canterbury), with a restricted and marginal agricultural base, depended upon practices of regulated access, seasonal mobility, long-term preservation and resource transport and exchange.

Regulation of resource access

By the early 19th century, Ngai Tahu territorial divisions were recognised at several levels. The eastern coastline was divided into Te Tai o Marokura (Kaikoura), Te Tai o Mahanui (Canterbury) and Te Tai a Arai Te Uru (Otago). In the hinterland, the Kaikoura people claimed south to the Waiau River. The Kaiapoi boundaries were from Waiau to the Selwyn River, with Taumutu territories to the south. Banks Peninsula was divided along the line of Akaroa Harbour to reflect the interests of Tuahuriri and related hapu (Kaiapoi) and Ruahikihiki and related hapu (Taumutu). The Hakatere (Ashburton) River divided Taumutu from Arowhenua territory, and the Makihikihi River was the northern boundary of Waitaki lands that reached to Pukeuri.⁷⁶

Northern Ngai Tahu in the early 19th century retained a significant correspondence of hapu and territorial integrity; for example, between the hapu Ngai Tuahuriri (a descendant hapu of Ngai Tuhaitara) and Kaiapoi district; between Ngati Irakehu and Wairewa; between Ngai Te Ruahikihiki and Waihora; and between Ngati Rakiwhakaputa and Rapaki, among others. Among Ngai Tahu in South Canterbury there were dominant hapu in each district, notably Ngati Huirapa and Ngati Whaea (both Ngai Tuhaitara-descended hapu) in the Temuka area, but, typically, many other hapu were represented quite strongly as well.

The causes of this variation are uncertain. Economically, it might reflect the more precisely defined land-holding of partly agricultural communities in the north versus obligate foragers to the south. Geographically, it might represent the topographical difference between the plains and hill country to the south. In any strip of land across the plains the range of resource environments was much the same, a circumstance that encouraged regular territoriality, whereas the uneven distribution of resources further south suited greater economic mobility through dispersed hapu networks. Historically it may have been influenced by the southward flight and social rearrangement of southern communities following the loss of Kaiapoi in 1831. Demographically, it might reflect a process of social disaggregation as migrant hapu moved south. Hapu arrived in northern Ngai Tahu districts

and claimed lands but, as their populations expanded, families moved further south and combined with families from other hapu to create new communities. The extent to which any or all of these factors were implicated is a matter of conjecture, but regional variation in social structure was related to different systems of resource management.⁷⁷

Ngai Tahu resource management involved mahinga kai, but also wakawaka – a share or division of land that often extended into adjacent lake or sea. There were two relationships between mahinga kai and wakawaka. In North and central Canterbury, wakawaka seem to have been major divisions of land and adjacent lake or sea, each of which could encompass numerous mahinga kai. Each wakawaka was owned more or less exclusively by a hapu, having either been allocated it by the senior chief of one of the major migrations, or having claimed it during the Ngai Tahu colonising era. However, in southern Ngai Tahu districts, including South Canterbury, wakawaka were small patches or strips of land within certain kinds of mahinga kai such as muttonbird islands, beech forests where kakapo and kiore were caught, and stands of ti. They were generally owned at a family level, and land between mahinga kai was open to use by all the members of the local community.⁷⁸ In both systems, wakawaka and mahinga kai were owned and used at several levels. Primary owners could trace their right through unbroken lineage connections, while others claimed a use right through family relationships or local residence. The result was that hapu and families held diverse portfolios of ownership and use rights, which could extend throughout much of the

FIG. 6 *Rakawakaputa, Port Cooper Plains*, an 1848 watercolour by William Fox.

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South Island. These provided an essential diversity in resource access that was exploited largely through seasonal mobility.

Settlement and seasonality

In the early 19th century, Ngai Tahu village settlements clustered into seven areas: the central Kaikoura coast, Kaiapoi to Waihora including Banks Peninsula, the Temuka district, the Otago coast, Molyneux Bay, central Foveaux Strait and the central Poutini coast. In the 1840s the main North Canterbury villages were in Akaroa Harbour, Puari (Port Levy), Wakaroa (Pigeon Bay) and Whangaraupo (Lyttelton), often with outlying hamlets, as at Rapaki and Purau. By the late 1840s settlement was resuming near Kaiapoi, notably at Tuahiwi and nearby (Figure 6). In South Canterbury, the main village following the early 1840s abandonment of Te Waiateruati Pa was at Waimate, which also had outlying hamlets and isolated houses and gardens in the Tengawai, Temuka and lower Waitaki Valleys. Beyond the main settlements were others used in transit between villages, and as mahinga kai. In Canterbury, recorded examples included huts in the upper Acheron, Waimakariri and Hurunui Valleys, at the confluence of the Rakaia and Mathias Rivers, and also at the junction of the Harper and Wilberforce Rivers, at Lake Sumner and Lake Tekapo, and in the upper reaches of the Opihi, Tengawai and Hook Valleys. Along the coast, huts were recorded at Hakatere, Waitarakao (Washdyke), Hinetekura (Timaru), Otipua, Waihao and Tauhinu in the Waitaki Valley.⁷⁹

Seasonal movements were very common and varied within each district, but in general there was a pulse of dispersal to and among mahinga kai during late spring to autumn, followed by contraction to permanent or long-term settlements in the winter and early spring. Halswell (1846) wrote of the South Island:

. . . on no Part of its Coasts is the Native Population stationary; they wander from one place to another without fixed Habitation, though they frequently return to the same Place. I do not mean that they are altogether migratory, never resting anywhere, but that scarcely any of them remain constantly in the same place.⁸⁰

Each community and family had its own resource schedule, which depended on its access rights and the availability of resources. Some of those occurred as brief seasonal flushes, while others could be obtained throughout much of the year, such as fern root or shellfish. Most seasonal movements in Canterbury were quite short, but the annual weka hunt by Waihora people took them on a round trip of 350 km to the Mackenzie Country, where they stayed for three to four months, preserving weka, New Zealand quail and eels for return to the main villages.

Preservation and storage

Food preservation was accomplished by drying or preserving in fat. Drying was used most commonly for fish. Small fish such as smelt were laid on mats in the sun. In 1844 at Waitarakao, Edward Shortland saw the wife of the Arowhenua chief 'Mrs Rehe, and a few women drying fish on the scorching sands . . . [cooked, they were] . . . excellent, having somewhat the flavour and size of whitebait'.⁸¹ Larger fish such as barracouta or eels (Figure 7), were cleaned, split and hung up to dry on large wooden frames (the pawhera method), or the bones were removed, the carcasses plaited together, steamed and hung to dry in the sun (the paku method). Marine fish were also steeped



FIG. 7 Preparation and drying of eels for packing into flax baskets, Wairewa, 1948.

PHOTO: K. V. BIGWOOD
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for several days in fresh water, then cleaned and dried (the moi method). Bales of dried fish, covered with mats, were able to be stored in the open on whata platforms. Fern root, raw and cooked ti root, karaka berries, steamed shellfish threaded on flax, and industrial resources such as dog skin and bird skin and feathers were also preserved by drying.

Preserving in congealed fat was a more complex technology that required the prior manufacture of totara-bark baskets or bags made from the blades of bull kelp (*Durvillaea antarctica*). Muttonbirds and weka, and also kaka, pigeon, tui and kakapo, were the main foods stored in fat, but any animal flesh could be stored for at least two years by this method. On the muttonbird islands, and at weka-hunting camps in the interior, elegant wooden bowls, often of koai wood, were used to collect fat from the cooking birds to pour into the containers once the carcasses were packed.

Transport and trade

The South Island was crossed by numerous trails, some of them very long. One ran from Kaiapoi to Taumutu and then down the east coast to Otakou, extending thereafter to Foveaux Strait. Another ran through the interior from Arowhenua, crossing Burkes Pass into the Mackenzie Country, then Lindis Pass into Wanaka, and along the Nevis Valley into the Maitara. There were many other inland trails, including several that crossed the Southern Alps through Arthur's, Browning and Harper Passes to provide access to the West Coast pounamu sources. Kaiapoi people walked often to Arahura, taking about 10 days.⁸²

Porters were used to carry quantities of goods along the trails, and there were many recognised stopping places for travellers, each with access to suitable convenience foods such as eels, fern root or weka. A dried lamprey

wrapped in a covering of bark or raupo, which when lit slowly smouldered to expose the heated delicacy, provided a hand-held snack on the march.⁸³ Sandals, leggings for protection against the prickly matagouri (*Discaria toumatou*) and taramea, and a flax rain cape were normal travelling clothes across the plains.

Prior to the availability of European boats, southern Maori used large single- or double-hulled canoes for fishing and transport at sea. Recollections about them suggest that while they would move well enough under sail in fair winds, they had no windward capacity.⁸⁴ Thirty men were required to paddle a double-hulled fishing canoe into a breeze. By the 1820s the replacement of the traditional spritsail by the European squaresail probably made them more efficient at sailing but also more vulnerable to capsize in a squall. By the 1830s European sealing and whale boats were the preferred vessels and the coastal trails were largely abandoned. The last double canoes afloat were seen at Akaroa in 1849.⁸⁵

The main craft on lakes and rivers was the mokihi, constructed from bundles of reeds or flax flower stalks (Figure 8). The Waitaki chief Huruhuru made one to take Shortland across the Waitaki River:

Our mokihi was made in the form of a canoe. Three bundles of 'raupo,' about eighteen feet long and two feet in diameter at the centre, but tapering towards the extremities, were first constructed separately, each being tightly bound and secured with flax; and were then fastened together to form a flat raft. Another bundle, similarly made, was next laid along the middle of this, and secured in that position forming a sort of keel . . . it was turned over, and two smaller bundles were laid along its outer rim, from stem to stern, for topsides, and all the vacancies within were filled up with layers of 'raupo,' tied down with flax. This sort of canoe is remarkably buoyant.⁸⁶

Walter Mantell crossed the Waitaki in 1849 with nine men and 200 kg of baggage in one mokihi: about 800 kg all up.⁸⁷ Mokihi were better suited in load-carrying capacity, stability and safety to the turbulent Canterbury

FIG. 8 A mokihi on the banks of the Waitaki River, sketched by Walter Mantell in October 1848.

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rivers than the river canoes (waka tiwai) used by Maori elsewhere. They were made as needed and left after a crossing for the next party's use, moving downstream on each trip until they eventually reached the sea and were abandoned.

The traditional system of exchange, sustained by portage and canoes, was not simply a mechanism for distributing resources beyond their locality of procurement. It was an important social as well as economic institution that involved kai haukai (feasting) and payment of tribute between hapu and communities. Exchange events commonly involved formal speeches and feasting over several days, during which all kinds of business could be transacted. In the 1840s, Port Levy Maori were seen carrying tonnes of dried shark inland, which they exchanged for eels with people who had come from Little River,⁸⁸ and there were similar arrangements between Kaiapoi settlements and Rapaki.⁸⁹ There was a long-distance trade in luxury goods, including kauru, titi, kotuku (white heron, *Egretta alba*) feathers and taramea perfume, which 'have always been articles of barter with the Natives of Cook's Strait, and the Ngatikahunu [eastern North Island], for which, preserved kumara, mats and canoes are received in return'.⁹⁰

In January 1844 Shortland followed part of a muttonbird exchange sequence.⁹¹ The Waikouaiti people from North Otago sailed north with a cargo of poha-titi (muttonbirds preserved in kelp bags wrapped with totara bark, each about 1.8 m long and ornamented with feathers), which were exchanged for kauru at Waimate. A cargo of muttonbirds was taken on to Banks Peninsula.

Conclusion

Early archaeological data and late ethnographic records differ in their chronological span and contents, offering contrasting perspectives upon human–environmental relationships prior to the settlement of Europeans. In the first, a typical sequence of initial island colonisation can be inferred.⁹² There is evidence of energetic exploration for potential resources, maintenance of long-distance connections by exchange with other colonies in New Zealand, clustered base-camp or village settlement in prime localities, and uninhibited resource exploitation, which, with assumed rapid population growth, led to significant environmental change.

The second perspective provides a comprehensive but chronologically narrow picture of a functioning traditional society in its ecological context. There was a broadly based subsistence pattern, probably broader than in early prehistory, even allowing for the different nature of the evidence. It was probably quite stable in the long term since it did not depend upon exploitation of highly vulnerable resources. The process of transition between the earlier and later patterns remains obscure. Nevertheless, from the perspective of natural history, the point to emphasise is that the Canterbury landscape and terrestrial biota that unfolded to scholarly inspection after 1850 were substantially the products of 600 years of Maori settlement.

Additional illustration credits

Figs 1 and 2: After Challis, A. J., 1995: *Ka Pakihi Whakatekateka o Waitaha: The archaeology of Canterbury in Maori times*, DOC Science and Research Series 89, Figs 5 and 12.

Figs 4 and 5: National Publicity Studios Collection, Alexander Turnbull Library, F-40049-1/2, Archives NZ AAQT 6401 A6116; F-40700-1/2, AAQT 6401.

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