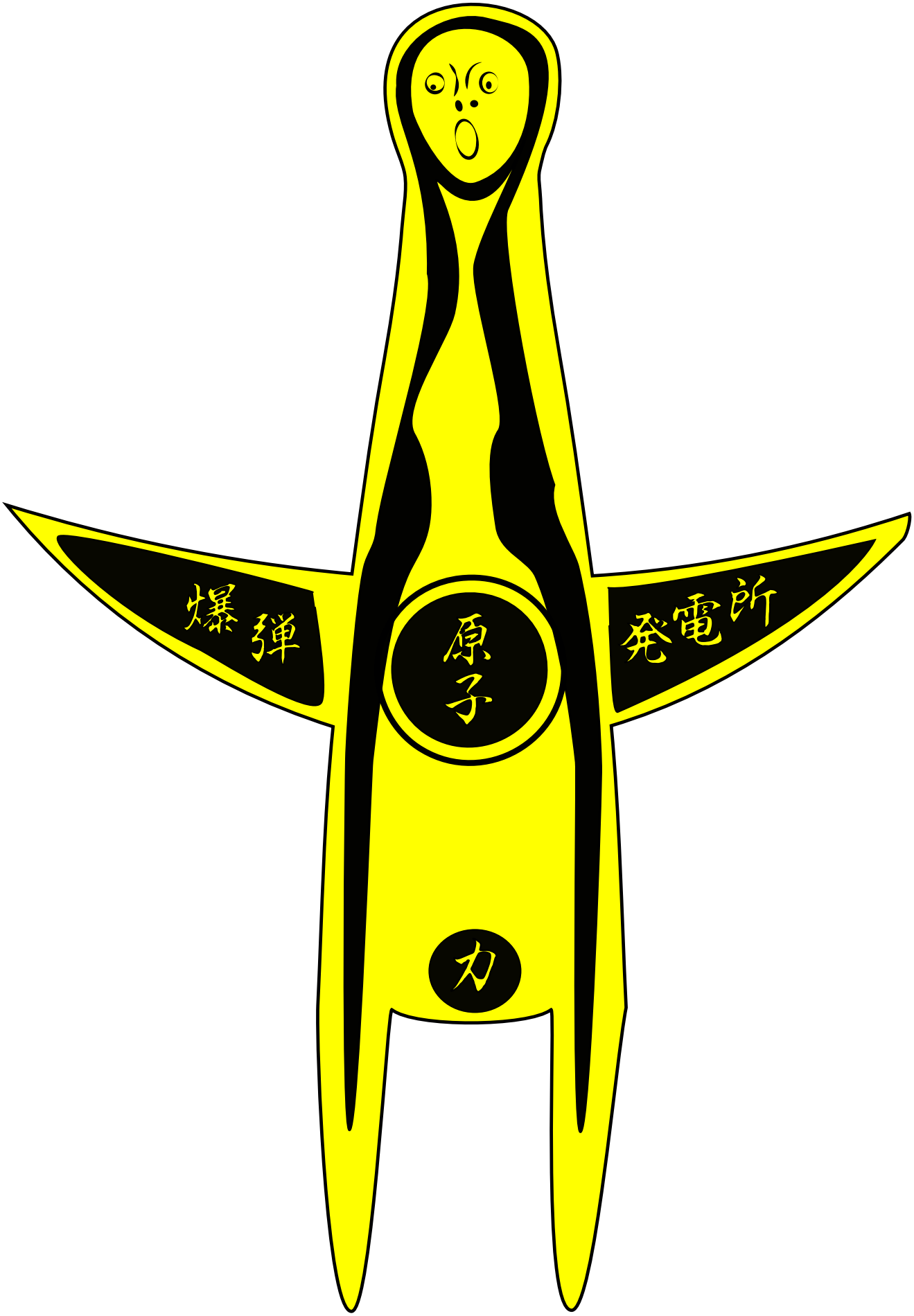
Felix Jawinski, Steffi Richter (eds.) | 2024

Fissures. Nuclear Post-War Japan

Gespalten. Das Nukleare Nachkriegs-Japan |「分裂」ー戦後日本の核社会



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This volume is part of the DFG project (406798635) “Split Society: Japan‘s Discursive Configuration Between the Atomic Bomb (*genbaku* 原爆) and Nuclear Power (*genpatsu* 原発)”, which is presented in the introduction and that took place between 2019 and 2023. Steffi Richter (Leipzig University) and Stephan Köhn (University of Cologne) led the project and worked with Felix Jawinski (Leipzig University), Sonja Hülsebus and Katharina Hülsmann (both University of Cologne) to complete it. In the summer term 2021, Steffi Richter and Felix Jawinski organised the lecture series “Japan’s Split Society Between Genbaku and Genpatsu: Media, Propaganda and Science” at Leipzig University. This is the basis for this open access volume, published by both in several languages. It includes the following articles:

Author	Title	DOI
Richter, Steffi: Einleitung	Schwierigkeiten, Unsichtbares sichtbar zu machen: Über diesen Band	10.48796/20240304-000
Richter, Steffi: Introduction	The Challenges of Making the Invisible Visible: About this Volume	10.48796/20240305-000
Jawinski, Felix	Walking Through the Nuclear Dispositif: Tsuruga City and the Fukui Atomic Information Centre	10.48796/20240304-001
Moriguchi Yuka 森口・土屋由香	*Atoms for Peace* Exhibitions in Japan: Localisations of Nuclear Modernity	10.48796/20240304-002
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Homma Ryu 本間龍	Nuclear Propaganda: Brainwashing Japan	10.48796/20240304-004
Homma Ryu 本間龍	日本国民を洗脳した原発プロパガンダ	10.48796/20240304-005
Nanasawa Kiyoshi 七沢潔	Wie friedliche Nutzung von Atomkraft und „Militärisches“ zusammenhängen. Einsichten aus der Welt des Fernsehens	10.48796/20240304-006
Nanasawa Kiyoshi 七沢潔	Accessing the Connection between the Peaceful Use of Nuclear Energy and the Military via Japanese TV Programmes	10.48796/20240304-007
Nanasawa Kiyoshi 七沢潔	原子力平和利用と＜軍事＞の接続～テレビ番組からの考察～	10.48796/20240304-008
Yamamoto Akihiro 山本昭宏	Darstellung von Kernenergie im Japan der 1950er Jahre. Am Beispiel des Manga *Astro Boy* von Tezuka Osamu	10.48796/20240304-009
Yamamoto Akihiro 山本昭宏	Representations of Nuclear Energy in Osamu Tezuka’s *Astro Boy* (*Tetsuwan atomu*) in the 1950s	10.48796/20240304-010
Yamamoto Akihiro 山本昭宏	手塚治虫『鉄腕アトム』における1950年代の核エネルギー表象に関する一考察	10.48796/20240304-011
Nakao Maika 中尾麻伊香	Making the Atomic Bomb Injury/Disease (In)Visible: Media Discourses and the Discrimination against *Hibakusha*	10.48796/20240304-012
Richter, Steffi	Mit Günther Anders den atomaren Bilderdschungel lichten	10.48796/20240304-013
Richter, Steffi	Shedding Light on the Maelstrom of Atomic Images	10.48796/20240304-014
Hopf, Anja	Friedliche Nutzung von Atomkraft und Bürger-wissenschaft vor Ort: Visualisierung des *Nuklearen*. Die Bürgergruppe *Eizō no kai* in Murakami	10.48796/20240304-015
Hopf, Anja	Citizen Science on the Ground: Visualising Nuclear Power. The Citizens’ Group *Eizō no kai* in Murakami	10.48796/20240304-016

Our project partners at the University of Cologne have published the volume as a result of their work: Köhn, Stephan/Hülsmann, Katharina (eds.) (2024): „Articulations of the Nuclear: Post-war Japan under the Spell of the Atomic Age“, Harrasowitz, 978-3-447-12199-6.

Representations of Nuclear Energy in Osamu Tezuka's *Astro Boy (Tetsuwan Atomu)* in the 1950s

Yamamoto Akihiro

1 Introduction: Why is Representation a Problem?

This paper analyses the representation of nuclear energy in 1950s Japan by examining one of Tezuka Osamu's most famous works: *Astro Boy* (*Tetsuwan Atomu* 鉄腕アトム). *Astro Boy* was serialised intermittently in the monthly manga magazine *Shōnen* from April 1952 to March 1968, and became even more popular when it was animated in the 1960s. Astro Boy is an important topic for two reasons. First, as the Japanese name of the protagonist, Astro Boy[1], suggests, the content and background of this manga are closely related to the nuclear energy discourse in Japanese society at the time. Second, it was widely read by children in the 1950s and 1960s. *Astro Boy* was drawn and animated in the midst of the nuclear age, which had begun with the dropping of the two atomic bombs in 1945. This was followed by a period in which politicians, scientists and the media generally praised the peaceful use (*heiwateki riyō* 平和的利用) of nuclear energy, while at the same time fearing the continued use of nuclear weapons. The dream of a bright future through nuclear power was the driving force in post-war Japan, which sought to rebuild on the basis of science and technology and achieved high economic growth. This "dream of nuclear power" (*genshiryoku no yume* 原子力の夢) was the ideal material for Tezuka to imagine the near future in *Astro Boy*.

Due to the rather late institutionalisation of Manga Studies, important debates about *Astro Boy* were initiated by critics rather than by academics. By far the most influential was the discussion by Ōtsuka Eiji. Ōtsuka critically discussed the nature of manga culture by linking the portrayal of the ageless Astro Boy to the developing post-war Japan (Ōtsuka 2003). However, Ōtsuka's main interest did not lie in the representation of nuclear energy. Later, after the Great East Japan Earthquake and the nuclear power plant disaster of March 2011, *Astro Boy* gained momentum and new studies appeared (cf. Katō 2011, Keio University Art Center 2012). However, only few of them focus on the criticism within this manga. In general, *Astro Boy* has been taken up as a symbol of post-war Japan, which guilelessly

1 The literal translation of *Tetsuwan Atomu* 鉄腕アトム is *Iron-Armed Atom*.

glorified the peaceful use of nuclear energy. As a study that questions such a premise and discusses specific representations of nuclear power, we can cite the pioneering work of Kawamura Minato (Kawamura 2011). Takeuchi Osamu, a leading expert on the study of Tezuka Osamu's work, also discusses the fear of nuclear weapons in Tezuka's manga (Takeuchi 2016). In response to these studies, this paper will analyse the 1950s issues of *Astro Boy* as part of the representation of nuclear energy in Japanese society at the time. The following three points distinguish this paper from previous research. First, it will discuss the changes in representation in *Astro Boy* in the 1950s. Second, it will elaborate on the significance of the representation of nuclear energy in *Astro Boy* in terms of the history of ideas (*shisōshi* 思想史). And third, it will examine *Astro Boy* in the context of the implementation of nuclear energy in Japan in the 1950s.

I would like to limit the scope of this paper to the 1950s and explain some fundamental thoughts about the function representation served in Japanese society at the time. Why is representation an issue at all? Representation here refers to the discourse in newspaper articles, but also to the pictures and words in manga. In the first half of the 20th century, the newspaper, publishing and film industries in Japan were largely capitalised. This process stagnated during the war years due the consolidation of companies and institutions, only to regain momentum in the 1950s. The 1950s also saw the flourishing of television and radio broadcasting. But how were readers and audiences in this context affected by the ongoing representation of nuclear energy? In this paper, I will refer to this interaction as sharing a "mood" (*'kibun' no kyōyū* 気分の共有). But what do I mean by "mood"?

The Japanese term "mood" refers to a relatively weak emotional state that lasts for an indefinite period of time. In other words, unlike a clearly verbalised and logical perception of the world, it is ambiguous and close to emotions and sensations. However, a "mood" is not unrelated to the perception of the world. Both are closely related to the subjective point of view of an individual or a group. A "mood" acts indirectly and continuously to shape individual and collective perceptions of the world. While it is possible to see a society's perception of the world in speeches or in journalism, it is much more difficult to grasp the "mood" behind them. A Japanese term that is very similar to "mood" is "air" (*kūki* 空気). "Air" is normally used to refer to a situation surrounding a person or group – just like in the expression "reading the air" (*kūki o yomu* 空気を読む)[2]. "Mood" and "air" can be understood as the difference between inside and outside, even though both concepts are different in nature. To illustrate this difference, I would like to refer to the critical analysis of "air" by Yamamoto Shichihei. He explains *kūki* as follows:

> Perhaps there is something that binds us all beyond any discussion or argument [and t]hat something is some standard that governs us and appears to us in major and everyday problems or even in sudden accidents that happen unexpectedly. (Yamamoto 2018: 16)

2 The English expression for this idiom is „to read the room".

In other words, the "air" has a direct and powerful effect on the perception of the world by individuals and groups. Therefore, individuals and groups are forced to be aware of its existence. A "mood", on the other hand, is more subjective, emotional and imposing, and acts indirectly on an individual or collective perception of the world. As these are rather ambiguous terms, not many academics have ventured a definition. For the purpose of this analysis, however, it was necessary to classify these definitions of the concepts of "mood" and "air". Having done that, I will now explain what I mean by "collective mood" (*shūdan no kibun* 集団の気分). A "mood", as already mentioned, is not so much reflected in speeches or discussions, but rather an emotion or impression that influences the world view that precedes them. Where, then, does the "collective mood" shared subjectively by individuals and groups manifest itself? This paper focuses on the representation of children's culture in order to grasp the "mood" in Japanese society.

To explain why I chose to focus on children's culture, I need to clarify the place of children's culture in 1950s Japan. At that time, culture was firmly linked to the age of the recipients. Magazines, in particular, were almost entirely stratified according to the age of the intended readers. Tezuka Osamu's *Astro Boy* was published in the monthly manga magazine *Shōnen*, which, as its name suggests[3], was edited and published for boys. Educationism (*kyōyōshugi* 教養主義) also played an important role in society at that time. In those days, one "graduated" from manga in the upper grades of elementary school. It was also shameful to read comics as an adult. This only began to change in the 1960s.

From these two points, we can draw the following conclusions. *Mangaka*[4], editors and other creators of children's culture at the time had only children as readers in mind. They had to create stories (representations) that even children could understand. In other words, it was not usual for them to show their own beliefs or opinions in their work. It was against this backdrop that Tezuka Osamu burst onto the scene in the post-war world of children's culture. Tezuka succeeded in "translating" his ideas about man and society into interesting and entertaining stories (representations) for children. Taking this a step further, one could argue that *shōnen manga* (i.e., manga for young boys) in the 1950s was the product of a system that produced representations within the bounds of decency that adults deemed acceptable for children to read. Therefore, unlike newspaper and magazine editorials, they did not deal directly with social issues. For example, in *Astro Boy* there are no *hibakusha*[5] from Hiroshima or Nagasaki. Real-life social issues have been filtered out by *mangaka* and editors out of consideration for whether or not they can be shown to children. However, authors and editors, who are the bearers of popular culture, must receive information from various phenomena in the real world and present them as trends (*ryūkō* 流行) for children.

3 *Shōnen* 少年 means (male) person of young age.

4 *Mangaka* 漫画家 is a manga author.

5 *Hibakusha* 被爆者 refers to the victims of the two atomic bombings in 1945.

At this point, the authors act as a magnetic field from which their perception of the world emerges as manga representations. In other words, it is their „mood" that provides the background for their stories. On the other hand, it is assumed that children, the readers, also create their own "moods" from these representations. This is the reason why this paper focuses on *shōnen manga* representations. The aim is to capture the "mood" about nuclear energy that was shared by Japanese society in the 1950s. But what was the "mood" of Japanese society in the 1950s regarding nuclear power? I will develop this argument in an attempt to clarify this, at least in part.

2 The Setting of *Astro Boy*: the German Film *Metropolis* and the Nuclear Age

Astro Boy[6], the hero of *Astro Boy*, is known as the embodiment of the nuclear dream. This is because he is a righteous robot, powered by nuclear energy, who saves humanity from various dangers. However, the image of Astro Boy as a light-hearted character only became widespread after the animated TV series; the 1950s manga *Astro Boy* also has its fair share of dark and tragic stories. But let me put aside the vague image of Astro Boy and examine the actual representations. First of all, as Kawamura Minato clarified, Astro Boy's power source was not explicitly stated to be nuclear power at the beginning of the series (Kawamura 2011: 57). According to Kawamura, it was not until the April 1956 issue of *Shōnen*, four years into the serialisation, that Astro Boy's power source was explicitly defined as a "super-small nuclear engine". This means that while Tezuka's unique view of the world is already visible in the name of Astro Boy, the relationship between *Astro Boy* and nuclear energy was only made explicit over the course of the serialisation and should be discussed through the representations that unfolded over time. In connection with Tezuka's idea of naming the main character Astro Boy, Tezuka drew inspiration for the righteous robot from two sources. The first was the movies and literature Tezuka had been exposed to since childhood, and the second was the post-war development of nuclear power.

Tezuka was born in 1928. The diversity of cultures that Tezuka absorbed has often been noted (Takeuchi 2008: 34-42). The Takarazuka culture, filmmakers such as Walt Disney and Hitchcock, science fiction novels by Karel Chapek, H. G. Wells and Unno Jūza, world literature represented by Dostoevsky, and the influence of Japanese and American comics are all well-known examples. Of all the influences on Tezuka's work, film was probably the most important. There were a few manga artists in post-war Japan who were less influenced by films, but Tezuka's love of the movies is particularly well-known. The influence of Hollywood films such as Westerns, movies about Ancient Egypt and science fiction has been discussed many times (Kusamori 2005: 38). While these influences certainly cannot

6 As mentioned in footnote 1, his Japanese name is *Atomu* アトム (engl.: atom).

be overlooked, this paper will focus on Fritz Lang's silent film *Metropolis*, released in Germany in 1927.

One of Tezuka's early works is *Metoroporisu*, published by Ikuei Shuppan in 1949. As the title suggests, it was inspired by the silent film *Metropolis*[7]. The film tells the story of Maria, a working-class girl, and a humanoid robot that resembles her. This setting can also be found in the manga *Metoropurisu*. The extent of the influence of the film *Metropolis* on his work can be seen in a text written by Tezuka himself. He states:

> Compared to the weak performance of the main cast, the movement of the masses, especially the mass of workers, is superb. Therefore, this is more of a mass drama (*gunshūgeki* 群集劇). Beginning with a modern ballet-like depiction of an underground factory, the energetic and stylised movements of the workers listening to Maria's speech, the workers being led by robots, and after a state of panic, the great mass is full of dynamic power. (Tezuka 2008: 228)

Tezuka's words discussing the film *Metropolis* can be read as if he were commenting on his own manga *Metoriporisu* and *Astro Boy*. It should be noted that the silent film *Metropolis* was the source of the setting of *Astro Boy*. A second factor that influenced *Astro Boy* is the development of nuclear weapons in the post-war period. This is probably the more direct influence. Tezuka himself recalls the following about the manga *Ambassador Atom* (*Atomu Taishi* アトム大使), published in *Shōnen* from April 1951 to March 1952, and which was the predecessor of *Astro Boy*. He wrote:

> Remembering the hydrogen bomb test conducted on the Christmas Island, I thought, 'Oh, if only we could use this science and technology for peaceful purposes', and decided to write a story about a fictional country that uses nuclear energy for peaceful purposes, hence the title *Astro Boy's Continent* (*Atomu no tairiku* アトムの大陸). *Atomu*, of course, simply means atom. (Tezuka 2016: 172)

Tezuka went on to explain that the editorial board of Shōnen magazine felt that a "continent" (*tairiku* 大陸) was too large, and so they hurriedly changed the name to *Ambassador Atom* because of the looming deadline (Tezuka 2016: 172). However, Tezuka's recollection in the above quote is not entirely accurate. The first British hydrogen bomb test on Christmas Island took place in March 1957. It is possible that Tezuka confused the British H-bomb tests with those of the US, but the first US H-bomb test in the Pacific was conducted in November 1952. Since the serialisation of *Ambassador Atom* had already ended with the March 1952 issue, it is not possible that Tezuka had read the news report about the US hydrogen bomb test before the serialisation of *Ambassador Atom*. However, it can be inferred that what Tezuka saw were reports predicting that the US might conduct a hydrogen bomb test. From 1950 to 1951, there were many reports in Japan about the

7 To distinguish the manga from the silent film, Tezuka's manga shall be referred to as *Metoroporisu*, a transliteration of the *katakana* name.

ongoing nuclear arms race between the US and the Soviet Union, and Japan was watching closely to see which of the two countries would develop a hydrogen bomb first. As an example, I would like to present an article with the headline: "Was there a hydrogen bomb test at Eniwetok Atoll?", which appeared in the Asahi Shinbun on 22 March 1951 (see Figure 1).


水爆も実験か
エニウェトク
【ワシントン二十日発AP特約】米原子力委員会が二十日明らかにしたところによると、太平洋のエニウェトク環礁で、いま精々の原子爆弾実験が行われており、この実験計画は「温室作戦」と呼ばれているが、委員会では非常に重要な価値をもつ実験だとしており、少くともその目的の一つは諸原爆に有益な資料を収集することにあると述べられている。
のラス・ヴェガスで実験された武器とは異った、すなわちその爆発力あるいはその使用目的で異った兵器が含まれるであろう。
また今年で一年以上も行われてきた総合的研究の成果についてどうなっているかをみるためにも計画中の水素爆弾の実験が行われることも考えられることである。

Figure 1: : "Was there a hydrogen bomb test at Eniwetok Atoll?" Source: Asahi Shinbun, 22 March 1951, p. 1.

In response to the US Atomic Energy Commission's announcement that an atomic bomb test would be conducted at Eniwetok Atoll in the Pacific Ocean, the article states that it was not an atomic bomb but "possibly a planned test of a hydrogen bomb" (Asahi Shinbun 1951: 1). Tezuka may have read one of these reports and therefore named the main character *Atomu* (= Astro Boy). However, as I have pointed out in previous research (Yamamoto 2015), Tezuka was not the first to name the main character of a manga or children's book Atom. There are precedents for this during the Occupation (1945-1952). What is certain, in any case, is that Tezuka was interested in nuclear testing even before the Bikini incident in March 1954, which sparked a widespread anti-nuclear movement in Japan. The Bikini incident will be discussed later, but first I want to look at *Astro Boy* from the perspective of the history of ideas.

3 Dr Tenma and Frankenstein

In the following, I will discuss specific representations of the manga *Astro Boy* and examine why such representations were created, based on the society of the 1950s and Tezuka's thoughts. Although it was obvious to readers of *Astro Boy*, and I have mentioned it before, I would like to stress once more that the representation of the righteous robot is owed to science and technology. The list of representations of Astro Boy's goodness is endless. A simple example can be seen in the *Astro Boy*'s issues titled *Frankenstein* (published in *Shōnen* between November 1952 until April 1953). The story starts in a robot factory. A robot named Frankenstein working there malfunctions, destroys the factory's robots and disappears. Tezuka is, of course, referring to Mary Shelley's novel *Frankenstein* and its adaptations – especially James Whale's 1931 film *Frankenstein*. Here, Frankenstein is used and manipulated by a villain as an instrument of crime. It is Astro Boy who prevents this from happening (see Figure 2; Tezuka 2009a: 173).

In this manga, the image of Frankenstein is the same as in the 1931 film. He is a giant dressed in black with a square head. In contrast, Astro Boy is small like a boy. He punishes

Figure 2: *Frankenstein*. Source: *Tetsuwan Atomu. Furankenshutainu no maki*, *Shōnen*, April 1953.

Frankenstein and in the end turns him into a good robot. The premise of these stories is based on the modern but naive view of science and technology can be good or evil, depending on how it is used.

The origin of the character Astro Boy, however, remains unclear. In *Ambassador Atom* (*Shōnen*, April 1951 – March 1952) the following story is told. Dr Tenma, who lost his child in a car accident, uses science to manufacture the child he lost. However, the artificial human cannot grow up. For this reason, Dr Tenma decides to give him up. Astro Boy here is presented as a "cursed child", born out of the scientist's sense of loss. In this setting, Frankenstein and Dr Tenma are depicted in a similar way. In addition, the similarities between Frankenstein and Dr Tenma (or Astro Boy) express the problems of science and technology in the 20th century in a concentrated way. To examine these issues, I would like to add some reflections on Mary Shelley's novel.

4 What is Frankenstein?

Written in 1818, Mary Shelley's *Frankenstein or a Modern Prometheus* is one of those novels that offer an almost allegorical reflection on the relationship between modern science and technology on the one hand, and man and society on the other. In the original novel, Frankenstein, now familiar to everyone from films and manga, is not the name of the monster, but the name of the man who created it. It is the name of the scientist Victor Frankenstein. The implications of this novel have already been studied extensively[8]. For this reason, I would like to focus on some evidence from the story of Frankenstein to examine the relationship between modern society and nuclear weapons. The epistolary novel Frankenstein begins with a letter from Captain Walton on his way to an Arctic expedition. Walton is portrayed as a brave man who has left behind a life of luxury and ease to find his purpose in exploration and discovery. His goal is to find a land free of snow and frost, but also to discover the secret of magnetism. To his surprise, at the ice-bound North

8 See e.g.: Hirono Yumiko 廣野由美子: "Introduction to Critical Theory: Lectures on the Anatomy of 'Frankenstein'" (*Hihyōriron nyūmon: „Furankenshutain" kaibō kōgi* 『批評理論入門 「フランケンシュタイン」解剖講義』, Chūōkōron Shinsha, 2005), and Ono Shuntarō 小野俊太郎: "The Spiritual History of Frankenstein: From Shelley to 'Empire of the Dead'" (*Furankenshutain no seishinshi: Sherī kara „Shisha no teikoku" e* 『フランケンシュタインの精神史: シェリーから『屍者の帝国』へ』, Sairyūsha 2015).

Pole, Walton meets a man named Victor Frankenstein and takes him aboard his ship. At first, Frankenstein is a man of few words, but as he talks to Walton, he starts to open up. Frankenstein begins to recount the horrors he has experienced. In his quest for knowledge, he has tragically lost everyone he loves. From his youth, Frankenstein was interested in alchemy and other sciences, but when he encountered the natural sciences at university, he abandoned alchemy and became passionate about scientific research. His work focused on elucidating the principles of life. Frankenstein immersed himself in research to create life without the help of a woman, all by himself as the sole parent. After two years of research, he produces a hideous monster, a huge, ugly creature. As soon as the creature begins to move, Frankenstein flees in disgust. Left behind, the monster reads the notebooks and books left by Frankenstein, memorising his words and learning the secret of his own birth. He discovers the whereabouts of Frankenstein's family and, in a misunderstanding, kills some of them. Despite being persecuted for his ugly appearance, the monster searches for his father, with whom he is eventually reunited. At this point, the monster begs him to create a female friend for him. Frankenstein agrees and returns to his research but is so disgusted that he destroys the almost finished female creature himself. Enraged, the monster, kills other members of Frankenstein's remaining family. Unable to leave the monster at large, Frankenstein takes it upon himself to kill him. To do this, he lures the creature to the Arctic. There he meets Walton, who is exploring the area. Walton's ship, carrying Frankenstein to the North Pole, gets stuck between icebergs. And as Frankenstein lies on his deathbed, the monster that has been chasing him throws himself into the icy sea, thus ending the story.

One could say that this novel is a tragic story of men obsessed with the development of modern science. The steam engine of the Industrial Revolution may well have been an unknown "monster", and the workers' revolts (see e.g. the Luddite movement) that resulted from the Industrial Revolution may also have seemed like a "monster" to the capitalists. As the novel was written during a period of social change, it may provide useful clues for examining the relationship between science and technology on the one hand, and society as such in the early 20th century on the other. However, the important point here is the unexpected catastrophe. The pursuit of a goal creates undue tension in the parties involved, and they are somehow worried. The supposedly glorious outcome is not what was originally envisaged, and it therefore ends tragically. This is evident in the plot, in which Frankenstein is hunted by the creature he has created, and also in the tragic end to the story. In the 20th century, science has grown beyond the discretion of the individual. The state took the lead in mobilising capital, scientists and labour, but also information. Through the division of labour in these huge centralised systems, each part pushed forward towards its own goals – as we have seen in the case of nuclear energy. This is the Frankenstein of the 20th century, and at this point I will show the connection between Frankenstein and Astro Boy (and Dr Tenma).

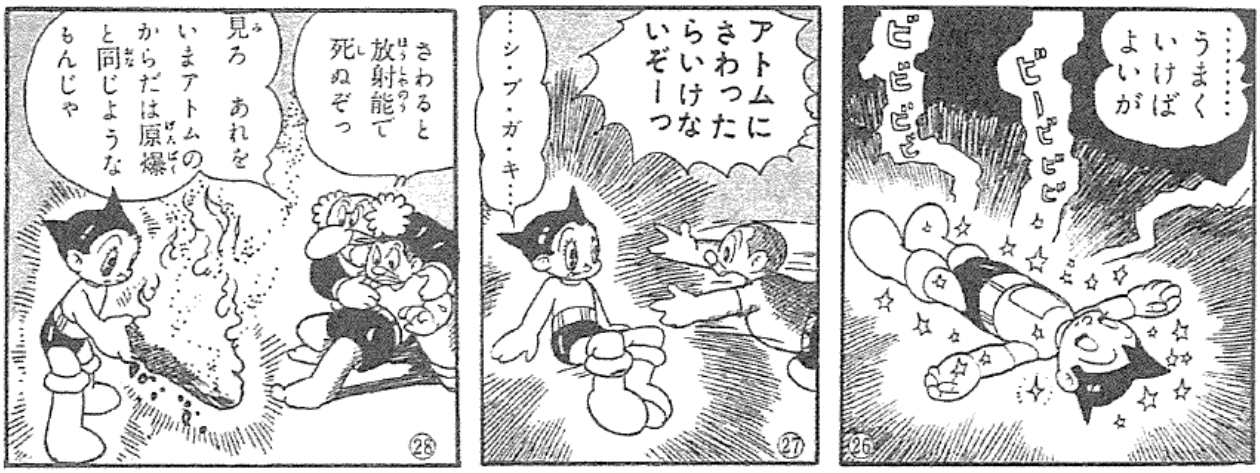

Figure 3: The Red Cat (*Akai neko no maki*) in *Astro Boy*. Source: *Tetsuwan Atomu*, *Akai neko no maki*, *Shōnen*, November 1953.

5 The Negative Aspects of Nuclear Energy

Let us return to the representation of Astro Boy. The view of science as something that can bring both happiness and danger, depending on how it is used, can also be applied to Astro Boy himself. In *Astro Boy*'s *The Red Cat* (*Akai neko no maki* 赤いネコの巻, *Shōnen*, May – November 1953), Astro Boy is portrayed as dangerous. After a fight with an enemy, Astro Boy has to be repaired by Dr Ochanomizu. Unfortunately, he increases his power output, causing him to emit light and become so powerful that anything he holds in his hand will ignite. Seeing this, Dr Ochanomizu says that "Astro Boy's body is now like an atomic bomb" (see Figure 3; Tezuka 2009a: 231). In this manga panel, he is very straightforward and says: "Touch it and you will die from radiation" (*sawaru to hōshanō de shinu zo!* さわると放射能で死ぬぞっ).

In another issue, there is also a drawing of irradiated workers in a uranium mine (*Astro Boy at the Equator* (*Atomu sekidō o yuku no maki* アトム赤道をゆくの巻), *Shōnen*, August 1953, additional volume). In this story, Astro Boy finds a bottle containing a letter on the ocean floor. When he reads it, he discovers that it is from someone asking for help. Later, Astro Boy enters the underground of an island. There he sees that people are being forced to work in a secret uranium mine where only humans are allowed to work, because the robots would rust. One of the workers says, "There's a big vein of uranium here" (see Figure 4, next page), and continues, "People come here and work for five years, and then sooner or later they die" (Tezuka 2009c: 16). I would like to recall two points here. First, in the early modern and modern periods, mines brought enormous profits to their owners, while at the same time causing environmental damage to the surrounding areas, as well as poverty and poor living conditions for the workers and their families. Secondly, technological advances, e.g. mineral refining, developed to maximise profits, have created other kinds of problems, such as air pollution. To rephrase these two points in terms of the problem outlined in this paper, we can call them the negative legacy of the collusion of capitalism

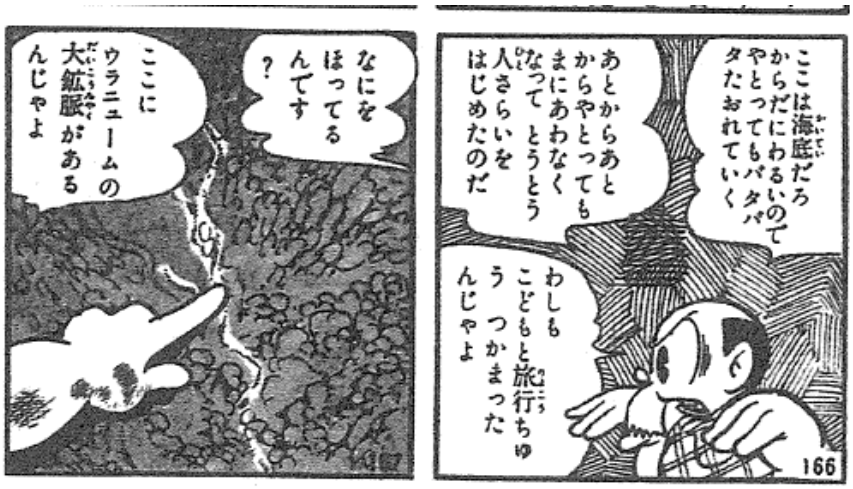

Figure 4: Astro Boy on the Equator (*Atomu sekidō o yuku no maki*). Source: *Shōnen*, August 1953, additional volume.

and developmentalism in modern Japan. Developmentalism here refers to the development of the periphery by various private actors, with the state playing a leading role. Developmentalism was a common ideology shared by the political and economic elites in Japan since the Meiji era (1868-1912).

Although the debate over the peaceful use of nuclear energy was not yet in full swing in Japan, the images I have shown so far were all produced and printed between 1953 and 1954. But because Tezuka was able to depict the negative aspects of nuclear energy in a medium that demanded a certain sense of decency (*ryōshiki* 良識), it is no exaggeration to call him an outstanding *mangaka*.

6 The First National Budget for Nuclear Energy, the Bikini Incident, and the Campaign for the Peaceful Use of Nuclear Energy

In March 1954, two major events related to nuclear energy occurred in quick succession. One was the so-called "third radioactive exposure" due to the US atomic bomb test at Bikini Atoll, and the other was the implementation of Japan's first nuclear energy budget. Let me first briefly summarise the key points of these events, which I have already described in detail (Yamamoto 2021). On 1 March 1954, the US hydrogen bomb test "Operation Bravo" was conducted at Bikini Atoll in the Marshall Islands. The *Daigo Fukuryū-Maru (Lucky Dragon No.5,* 第五福竜丸), a tuna fishing vessel at sea at the time, was exposed to radioactive fallout, affecting 23 crew members and contaminating their catch. This happened even though the vessel was outside the danger zone designated by the US for the test. After this incident was reported in mid-March, the Japanese, horrified by the fallout, began to express their opposition to atomic and hydrogen bomb testing through signature campaigns and other means. The following year, in August 1955, the World Conference Against Atomic and Hydrogen Bombs was held in Hiroshima, cementing Japan's national identity as the

"A-bombed nation". At the same time, the Japan Confederation of A- and H-Bomb Sufferers Organizations (*Nihon gensuibaku higaisha dantai kyōgikai* 日本原水爆被害者団体協議会) gained momentum, and in March 1957, the Law on Medical Care for Atomic Bomb Survivors (*Genshibakudan hibakusha no iryō-tō ni kan-suru hōritsu* 原子爆弾被爆者の医療等に関する法律) was enacted. Under this law, those certified as atomic bomb survivors were entitled to medical examinations twice a year. However, the scope of certification for atomic bomb survivors has long been debated and is still an issue today (Naono 2011)[9].

Meanwhile, in March 1954, the Diet approved a budget for nuclear energy, and Japan took its first step towards the peaceful use of nuclear energy. As is well known, the background to the approval of the nuclear budget was the international nuclear policy of the United States. In December 1953, US President Dwight D. Eisenhower delivered the "Atoms for Peace" speech to the United Nations General Assembly, stressing the need to establish an International Atomic Energy Agency and to promote the peaceful use of nuclear energy. To keep up with this trend, Japan allocated a budget for nuclear energy. Once a member of the Western world, Japan sought the cooperation of the US and the UK to promote nuclear research for peaceful purposes.

Although fear and opposition to the atomic and hydrogen bomb tests grew, expectations of the peaceful use of nuclear energy did not diminish. On the contrary, the belief that the atomic and hydrogen bomb tests were a misuse of enormous nuclear energy, and that the realisation of a better future awaited us if we used the same energy for good and peaceful purposes, was strengthened. Accordingly, it seemed unquestionable that there could be any connection between the military and peaceful uses of nuclear energy.

Next, I would like to discuss the campaign for the peaceful use of nuclear energy. Following Eisenhower's "Atoms for Peace" speech in December 1953, Japanese newspapers launched a campaign for the peaceful use of nuclear energy. The most famous and influential campaign was that of the Yomiuri Shinbun. From 1 January to 9 February 1954, the Yomiuri Shinbun began publishing educational articles on the peaceful use of nuclear energy in a series of 31 articles, titled "The Sun is Finally Captured". The series was intended to provide a diachronic account of the discovery of radiation and nuclear fission, the atomic bombings of Hiroshima and Nagasaki, and the progress of nuclear energy research in the post-war world. At the same time as the newspaper campaign, exhibitions were held around the country to educate people about the peaceful use of nuclear energy. The Yomiuri Shinbun organised the exhibition *Anyone Can Understand Atomic Energy*, which was held at the Isetan department store in Shinjuku/Tōkyō from 12 to 22 August 1954. On 1 November 1955, the nationwide touring exhibition *Peaceful Uses of Atomic Energy* was launched. Newspapers from various regions were involved in the organisation as the peaceful use campaign was in full swing. This exhibition was first held in Tōkyō's

9 For a detailed analysis of this issue, see the article by Nakao Maika in this volume.

Hibiya Park and later in nine other cities. In total, it was visited by more than 2.6 million people. How did the image of *Astro Boy* change in this social context?

7 A Society in Fear of Radiation

Astro Boy's *Coral Reef Adventures* issue (July 1954, summer supplement) contains evidence of how the Bikini tests affected this manga. The timing of its publication suggests that it was drawn immediately after the Bikini incident. The story is as follows.

Astro Boy asks Dr Ochanomizu to give him a fearful heart so that he can be like a human for two days. Later, the captain of a fishing boat asks Astro Boy for help. Six months earlier, while sailing around the equator, he passed a ship that turned out to be highly radioactive. His crew have been falling ill ever since. Astro Boy sets off to investigate the "Ghost Ship", as he calls it. He finds the "Ghost Ship" and, despite his fears, enters it. Inside he finds horses, rabbits, guinea pigs and other animals. The ship had been used for hydrogen bomb tests and the animals had been brought on board to study the effects of radiation, then was left to drift after the H-bomb test. The animals present Astro Boy with a note outlining the schedule for the next H-bomb tests and the location of the ship carrying the animals for the test. The message tells him to save the animals, but Astro Boy, who now has a fearful heart, refuses to do such a scary thing. Just then, the two-day deadline expires, and Astro Boy returns to his original robot heart. He manages to save the animals just before the test. The story ends with Astro Boy telling Dr Ochanomizu, "I don't need such a thing as a fearful heart" (Tezuka 2009b: 79). Later, in *Jungle Taro* (Omoshiro Book, August 1958 – June 1959), Tezuka even draws a group of animals used in hydrogen bomb tests rising up in defiance. Kawamura Minato (2011) says the following about *Coral Reef Adventures*:

> This made people rightly afraid of the threat of contamination of the Earth by the dispersion and spread of radioactivity caused by the hydrogen bomb test at Bikini Atoll. As a 'child of science', it was Astro Boy's job in this case to be rightly afraid of what science had created. […] It is not a matter of overcoming or neutralising fear, but of confronting it. (Kawamura 2011: 67-68)

Looking back at Japanese society in the aftermath of the nuclear disaster caused by the Great East Japan Earthquake of 11 March 2011, Kawamura's reading of *Astro Boy* about the need to face one's fears is only understandable. Sakai Takashi's essay "In Defence of the 'Radioactive Brain[10]'" gives us complementary ideas about the outpouring of anxiety, cynicism and condemnation about radiation contamination and contaminated water. Sakai focuses on the "radioactive brain", which is "a unique figure that can be seen as a nodal point in the discourse and imagery expressing the tendencies of various forces triggered

10 The Japanese term is 放射脳, which can be transliterated as *hōshanō*. This term both a homonym for radioactivity (放射能) and a neologism and pun that can be translated as "radioactive brain".

by 3/11" (Sakai 2021: 112). Sakai points out that the term "radioactive brain" and the image of "madness" it evokes are directed at the "excesses" of anti-nuclear groups, and that they are "an expression of the tendency to 'divide' those who question nuclear power into good and bad" (Sakai 2021: 112). Comparing Japanese society after 2011 with that after the 1954 Bikini incident, it seems that the fear of radioactivity was more intense in 1954. The evidence for this is undoubtedly Astro Boy.

8 Fear of Peaceful Use

In 1957, Disney, a company Tezuka admired, produced and released an educational and enlightening film called *Our Friend the Atom*. Using the story of *Aladdin and the Magic Lamp*, the film explains the mechanism of nuclear power and tells people that it is possible to master the "genie" – i.e. nuclear energy. By contrast, Osamu Tezuka's 1950s issues of *Astro Boy* successfully depict both the positive and negative aspects of nuclear power. However, this can only be said for the 1950s. From the 1960s onwards, the shadows of the atomic bombs and the negative aspects of the peaceful use of nuclear energy were gradually erased from *Astro Boy*. By this time, its popularity had grown even more. It was also made into an animated series, which made Astro Boy the "friend" of Japanese children. Therein lies the limitation of children's popular culture. The gradual loss of *Astro Boy*'s nuclear imagery, which was common in the 1950s, can be attributed to a change in the "mood" of Japanese society. The fear of the peaceful use of nuclear energy, which existed to some extent in the 1950s, had almost disappeared. In Japan in the late 1950s, concerns about the peaceful use of nuclear energy emerged as a problem of where to locate nuclear research facilities. This problem arose because nuclear power generation was no longer a dream but a reality. Let me briefly review the history of the introduction of nuclear reactors in Japan.

In May 1956, Sir Christopher Hinton, Director of the British Atomic Energy Authority, visited Japan. He toured Japan to promote the type of reactor they used at Calder Hall nuclear power station and was also invited to a major sponsorship event initiated by the Yomiuri Shinbun newspaper. In response, the Japan Atomic Energy Commission sent a delegation to the UK in October that year. In March 1957, the Japan Atomic Energy Commission decided to purchase a nuclear reactor from the UK. In November of the same year, the Japan Atomic Power Company (JAPC) was established as the body responsible for introducing the British reactor. However, as there were doubts about its earthquake resistance (and other issues), the Japan Atomic Energy Commission held a public hearing on the introduction of a Calder Hall-type reactor to Japan.

Another project of the Japan Atomic Energy Commission was to find a site in the Kansai area to build a nuclear reactor for research and development for the Kyōto University Nuclear

Reactor Institute. However, the city council of Uji in Kyōto Prefecture, which was listed as a potential site, passed a resolution against the project in July 1957 due to opposition from tea companies and others. After this, the location of the reactor became even more controversial. Takatsuki City in Ōsaka Prefecture and other cities were considered, but opposition from the local community held them up, and finally in 1961 it was decided that the Kyōto University Nuclear Reactor Institute would be located in the town of Kumatori in Ōsaka Prefecture. This shows how difficult it was to find a site – something that continues to plague the nuclear power industry to this day. The city of Uji, with its tea industry, and the city of Takatsuki, halfway between Ōsaka and Kyōto and with mountains as its water source, were able to reject the nuclear reactor. On the other hand, this means that areas without significant industry and far from urban areas could not and still cannot easily reject nuclear reactors. It seems that if the "benefits" of a research facility, such as an increase in population and higher property tax revenues for the municipality, are significant, they may be inclined to approve the construction of nuclear reactors and related facilities, such as nuclear power plants and disposal facilities. Although scientists like Taketani Mitsuo 武谷三男 and Sakata Shōichi 坂田昌一 questioned the government's approach to research and development and raised concerns about the safety and airtightness of reactors used for peaceful purposes, they had no doubt that this was an important goal for Japan to achieve. Only a few were totally opposed to research and development. The debate was not whether there should be nuclear research and development, but rather what direction it should take. So why did movements against the construction of nuclear reactors emerge?

The two most likely factors were the Bikini incident and the signature campaign by the Japan Council Against Atomic and Hydrogen Bombs (*Gensuibaku kinshi Nihon kyōgikai* 原水爆禁止日本協議会). Nuclear reactors emit "ashes of death"[11] in the same way as atomic and hydrogen bomb tests, and in this sense they were considered dangerous facilities. Needless to say, nuclear reactors emit large amounts of radioactive fallout only when they explode, and minimal amounts during operation. The amounts released during normal operation are not comparable to the fallout from nuclear bomb tests. Regardless of the small amounts emitted, these activist groups have raised the issue. In Japan, where opposition to atomic and hydrogen bomb testing was strengthened by the Bikini incident, people were aware of the link between atomic and hydrogen bombs and nuclear reactors. It can be assumed that these international and national circumstances gave rise to the movement against the construction of nuclear reactors. This is my hypothesis based on historical facts. Using the terminology mentioned above, one could say that the fear about the connection between atomic and hydrogen bombs and nuclear reactors was the "mood" of Japanese society at that time. This kind of anxious "mood" can be clearly seen in *Astro Boy*'s volume *Atlas* (*Shōnen*, March 1956). In a future society, this manga explains, the

11 In Japanese "radioactive fallout" is often referred to as *shi no hai* 死の灰, which can be translated as "ashes of death" or "deadly ashes".

Figure 5: *Atlas (Atorasu no maki) in Astro Boy. Source: Tetsuwan Atomu, Atorasu no maki, Shōnen*, March 1956.

peaceful use of nuclear energy causes Mount Fuji to erupt. The explanation in the panels of Figure 5 says: "For the past decade, there have been plans to use nuclear energy to clear the Japanese Alps and turn them into a large farmland. Mount Fuji, a dormant volcano for a thousand years, has been awakened by this" (Tezuka 2009b: 201). With this, Tezuka provides a concrete example of the possible unexpected negative effects of the peaceful use of nuclear energy.

9 Conclusion

As I have shown in this paper, it is easy to find representations of the negative aspects of nuclear energy in the 1950s issues of *Astro Boy*, including atomic and hydrogen bomb tests, the dangers of Astro Boy himself and even natural disasters caused by the peaceful use of nuclear energy. However, there were also innocent and bright images of the future that seemed to balance out these negative aspects. These expressions in children's culture represent the "mood" of society at that time. Those of us living in the 2020s know that the innocent "future of those days" was never achieved. That is why, when we read *Astro Boy*, we are haunted by a sense of bitter regret.

(Translated from Japanese by María Saavedra Isusi)

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