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Physis, *Shizen* (自然) and Nature in Aristotle's Biological Writings : Hylomorphism in the Aristotelian Biology

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This paper clarifies the diverse meanings of *physis* in Aristotle's biological writings through examinations of how each use of *physis* should be translated into Japanese in the respective contexts. It reveals the role of the concept of *physis* in hylomorphic examination of organisms. The most common Japanese translations of *physis* are *shizen-butsu*, *shizen-honsei*, and *shizen*. Aristotle classifies material nature into three kinds of matter : elements and homogenous and non-homogenous bodily parts. In his biological writings, another kind of matter is found, which is not appropriately translated as *shizen-butsu* or *shizen-honsei*. It is translated instead as *tsukuri* in a new translation of *HA*. It is matter but is more proximate to the form of an organism. On the other hand, formal nature is translated as *shizen-honsei*. While the *physis* in the phrase *kata physin* (in accordance with nature) is translated as *shizen-honsei*, it is sometimes translated as *shizen*. The *physis* in the latter case is the order or law in the natural world. This *physis* is similar to that used as the subject together with agency verbs in *PA*. It determines the characteristics of animal species in their interrelationships with matter of the animal species in question.

1. Loss and gain in translation

'One of the major concerns of translators is to ensure that the translation preserves the content of the original without losses ; any loss, regardless [of] whether it is of meaning or tone, should be recovered by the procedures of compensation' (Vinay & Darbelnet, 1995, p. 169). Translators intend to produce equivalence between the original text and its translation even if it may be 'an efficient social illusion' (Pym, 2014, p. 159). Still, it is difficult to reproduce all the nuances of the original text, especially between two languages that involve two diverse linguistic and cultural traditions (e.g. Greek and Japanese). Accordingly, while it is also important to consider how the logical structure of the argument in the text of a language of origin can be reproduced in a language with a very different syntax, it is difficult to find an appropriate translation word for the relevant context even if there is a fixed translation word. A Japanese word or phrase that lexicographically has the same meaning as an English word does not fit or seem natural in a

similar context ; however, this correspondence may only be superficial. In practice, some loss of original intent during translations is unavoidable. Translators are sometimes forced to make up for this loss by introducing a gain – that is, new information not expressed clearly in the source language. Implicit information in the original text is another critical part of the interpretation.

The Japanese word *shizen* (自然) is commonly translated as 'nature'. However, it does not cover the full meaning of 'nature', and, in many contexts, it is better to translate it using *honsei* (本性)[1] or other Japanese words. Based on this, translators must determine the implications of *physis* in each context.

This discussion is not about the classification of the meanings of *physis*, like in *Metaph*. 5. 4, nor about the classification of Japanese words used to convey it. The following discussion uses three common Japanese translations of *physis* for convenience, but this is not intended to classify the meaning of *physis* into three categories. There are also often important differences in meaning even if the same translation is used. What is at issue here is the case in which one is at a loss to choose a translation and wonders what kind of translation would convey Aristotle's intention. It is precisely in such cases that the translator must clarify what was not explicitly stated in the original language.

This paper aims to clarify the multiplicity of the concept of *physis* in Aristotle's biological writings and to confirm its implications through examinations of how each *physis* should be translated into Japanese in its respective context. We limit the discussion to *physis* in Aristotle's biological writings because he regards living organisms as most typical substances, as suggested in his definition of *physis* in *Phys*. 192b20–23 ('a source or cause of being moved and of being at rest in what to which it belongs primarily, in virtue of itself and not in virtue of a concomitant attribute' (Hardie and Gaye, 1930) applies best to this case beside primary elements). Furthermore, the concept of *physis* is important for understanding Aristotle's hylomorphic explanation of an organism, as suggested by the distinction between formal and material nature.

The structure of the paper is as follows. First, three main Japanese words used to translate *physis* are shown. Then, the utilisation of *physis* referring to an organism is evaluated. The usage of *physis* referring to three kinds of material nature is discussed, and another type of material nature, translated as *tsukuri*, is introduced. Afterwards, two kinds of *physis* in *kata physin* (i.e. in accordance with nature) and *para physin* (i.e. contrary to nature) are distinguished. Last, with this distinction in mind, the text in which *physis* is used as the subject of a sentence with agency verbs is examined. In the conclusion, the connotation of

1) Some theorists on Japanese thought pointed out that the traditional *shizen* (自然) before the 19th century does not imply normativity and is somewhat incompatible with the definition of the inherent essence of things (Maruyama, 1998, p. 407 ; Sagara, 1989, p. 20).

physis in hylomorphism is suggested.

2. Japanese translations of *physis* (nature)

In the beginning of his essay on nature (*physis*), Tanaka (1986, p. 41) classifies meanings of nature (*physis*) into three categories: (1) 'natural objects', such as animals and plants, fire, wind (air), water, and earth; (2) characteristics common to such natural objects – that is, the things that make natural objects what they are; and (3) 'the entire natural world, the totality of natural objects comprehending all of them, which may be called *kosmos*. Tanaka doubts whether *physis* without such an additional word as *holê* (whole) is used to refer to nature in the third sense, 'something whole including all natural objects, thought of in terms of "*tenchi-shizen*"' (Tanaka, 1986, p. 61; cf. Collingwood, 1945, p. 43). However, there are (3') other cases in which it seems better to translate *physis* as *shizen*, which does not belong to *physis* in the first or second sense.

Physis in the first sense can usually be translated as (A) *shizen-butsu*, but it is sometimes desirable to look for other words that enable the reader to understand smoothly in each context, although it is difficult to find an alternative[2]. The same seems to hold for English translation. There are some cases in which it is hard to understand if *physis* is translated as 'nature'. We sometimes find other English translations for *physis* in this sense. For example, it is translated as 'organism' when it refers to a living animal[3] and as 'material' when it refers to what constitutes a body.

Physis in the second sense is translated as (B) *honsei* or *shizen-honsei*[4]. The example of assigning the word *sei* (性) as a translation of 'nature' is older than *shizen*[5]. For example, 'human nature' was translated as *jinsei* (人性) and 'natural law' as *seihô* (性法) in the Meiji-era (1868–1912)[6]. *Honsei* means 'inherent or innate characteristics' and indicates something that the characteristics belong to. *Physis* in the second sense also indicates a limiting genitive, such as 'the nature of blood' (PA 650a1) or 'the nature of the *pneuma*' (*MA* 703a21–22).

2) An individual animal, for example, is really a *shizen-butsu* (natural object), but it is rarely called so except when contrasting it with an artificial object.

3) *Physis* with a plural genitive noun of an organ composed of parts, such as teeth or skeletal bones (Cf. Lennox, 2001a, p. 216), is sometimes not translated as a parenthesis. While Lennox (Lennox, 2001a) translates it as 'nature of . . .', Sakashita (Sakashita, 2005) translates it as *shizen-butsu*.

4) With regard to the meaning of a combination of Chinese letters, the second half (i.e. *honsei*) is more significant. If I were to venture to explain the difference between *honsei* and *shizen-honsei*, I would say that the latter refers to *honsei* that belongs to the *natural thing*.

5) In the seventeenth-century translation of Aristotle's *Categories* in Chinese (名理探*ming li t'an*) *sei* (性) is used as a translation of 'nature' (Wardy, 2000, p. 96, 159).

6) Today 'human nature' is translated as *ningen-honsei* (人間本性) and 'natural law' as *shizen-hô* (自然法) because *sei* (性) was increasingly used in the sense of sex in the Taisho era (1912–1926).

(C) *Shizen* is generally regarded as a standard translation of 'nature', but its meaning is obscure. The Japanese dictionary explains it as 'things or phenomena that exist without human intervention, such as mountains, rivers, oceans, plants, animals, rain and wind. Also, not being subject to any human intervention' (Heibonsha). In referring to individual concrete physical objects, (A) *shizen-butsu* is more appropriate while *shizen* is better in referring to those various natural objects and phenomena as a whole. *Shizen* also refers to the natural state of things as they are far from human agency. It is used in various case in which it does not seem appropriate to understand *physis* in sense (A) or (B). Further, when it is better not to specify the exact indicative content of *physis*, *shizen* is adopted. For example, when Aristotle classifies *physis* into the nature with respect to shape and the material nature (*PA* 640b29–30), the former clearly corresponds to (A) and the latter to (B), but the same translation *shizen* should be adopted.

Although we have classified the meanings of nature in this way and given the corresponding Japanese translations, there are instances in which several *physis* are used in the same context with different meanings, and the translator may struggle to clarify the differences between the meanings while suggesting that they are the same word, as seen in Text-1. This suggests that these *physis* are used in close association.

> Text-1 This completes our statement of the purpose for which horns (*hê tôn keratôn physis*) exist and the reason why some animals have them and some do not. We must now describe the character of that 'necessary nature' (*tês anankaias physeôs*), owing to which certain things are present of necessity, things that have been used by 'rational nature' (*hê kata ton logon physis*) to subserve a 'purpose'. (*PA* 663b22–24, Peck, 1937)

3. Organisms

First, we will consider the text in which *physis* is used in sense (A) and (C). Aristotle sometimes uses *physis* to indicate a living creature or an organ. Text-2 is part of the argument that autogenous insects may mate and produce offspring, but these offspring must be a different kind from their parents and cannot mate. If they produce offspring of a different kind, the offspring will produce offspring of an even different kind, resulting in an ever-increasing number of different kinds.

> Text-2 If [the offspring were] unlike [their parents], and yet able to copulate, then there would have come into being again from them another kind of creature (*physis*) and again another from these, and this would have gone on to infinity. But [n]ature

> (*physis*) flies from the infinite, for the infinite is unending or imperfect, and [n]ature ever seeks an end. (*GA* 715b12–16, Hett, 1912)

Peck (1942, p. 7) translates *hetera* . . . *physis* (715b13) as 'another different manner of creature' and Balme (1992, p. 22) as 'a different nature of animal'[7]. This *physis* seems to be in sense (A) and to concretely mean 'an animal'. Shimazaki (1969c, p. 94) – the first Japanese translator of Aristotle's biological writings – translates it as *chigau dôbutsu* (i.e. a different animal). This choice seems to be better than *shizen*, because it clarifies the meaning of this *physis*. Yet, readers are unable to find a relationship between the quotation above and its following sentence '[n]ature flies from the infinite' (*GA* 715b14–15)[8]. It makes sense to use the word *physis* for the first 'nature' even though the word 'an animal' could have been used there. The second and third *physis* suggests that individual organisms exist in a natural order.

4. *Physis* as formal or material nature

In *PA* I 1, Aristotle enumerates the meaning of *physis*. He criticises ancient natural philosophers, such as Democritus, and points out that they examine only the material cause and are ignorant of the multiple meanings of *physis*.

> Text-3 For the nature in respect of shape (*hê kata tên morphên physis*) is more important than the material nature (*tês hylikês physeôs*). (*PA* 640b28–29, tr. by Lennox, 2001a)

> Text-4 . . . , especially since the nature (*physis*) of something is spoken of and is in two ways : as matter (*hylê*) and as substantial being (*ousia*). And nature as substantial being is both nature as mover (*kinousa*) and nature as end (*telos*). (*PA* 641a25–27, tr. by Lennox, 2001a)

This notion explains Aristotle's theory of the four causes. In *Phys*. II 1, he states that '[s]ince "nature" refers to two things – that is, both to form and to matter – our investigation had better imitate an enquiry into what it is to be snubness, or something else which should not be considered in isolation from matter, but should not be restricted to matter either' (*Phys*. 194a12–15, Waterfield, 1999). A formal cause is, in a certain sense, one with a moving cause and a teleological cause. Aristotle also inquiries about animals, including

7) Lefebvre (2014, p. 1578) also translates it as *une nature différente*.
8) For similar usage of *physis*, GA 724b33, 735a4, 747a20.

their body parts and reproduction mechanisms, from two perspectives : their formal and material aspects. The appropriate translation of *physis* as a formal aspect is *hosei*. Explaining formal nature results in teleological explanations, which pervade Aristotle's biological inquiry, except in *HA*.

The *physis* translated as *honsei* reveals the essential or main characteristics of 'something'. This 'something' is easily understood, although the 'something' is not always explicitly stated. On the other hand, as regards *physis* as material nature, usually translated as *shizen-butsu*, Aristotle says that the ancient natural philosophers try to explain various natural objects by considering earth, fire, and so on as the 'underlying matter'. However, this is not sufficient to explain the material aspects of an animal. He points out that, while such elements are the matter of the animal body, the homogeneous parts, such as flesh, bones, and blood, and the non-homogeneous parts, such as a face, hands and feet, are also its matter (*PA* 640b15–25).

From the next section, we will first consider the usage of *physis* as the material nature. It is common to translate it as *shizen-butsu*, but this may not always express Aristotle's intention well, and I will explain it.

5. Three kinds of material nature of animals

Aristotle considers matter of animals on three stages. Although it may be appropriate to use *sozai*[9] for the matter at the elemental level, it is better to translate it as *shizen-butsu* for the reader to associate 'nature' with it.

> Text-5 . . . for hoof and nail have the same nature (*physin*) as horn so that the splitting of the hoofs and horns occurs at the same time and in the same animals. And again, the splitting, i.e. the cloven hoof, is present in virtue of a deficiency of this nature (*physis*), . . . (*PA* 663a28–32, Lennox, 2001a)

The first sentence suggests that the hoof and nail are made from the same kind of material, which Aristotle says is bodily and earthen. The first *physis* here refers to the *quality* of the material making up the body and so can be translated as *honsei*. However, the second sentence is clearly related to the *quantity* of the material. The second *physis* refers to the material itself. Ogle translates it as 'material' while the first is 'nature'. The second is clearly 'the material nature', which Aristotle mentions as a counterpart of 'the nature in respect of shape' in *PA* 640b28–29. Material nature may be described in terms of its quality

9) In *new Completed Works of Aristotle translated into Japanese* the word *sozai* is used as a translation word of *hylê* (matter), while it have been usually translated as *shitsuryô* (質料).

or it quantity, and it is advisable that the reader be able to read the relationship as well as the difference between the two and that the first one be translated as *shizen-honsei* and the second as *shizen-butsu*.

On the other hand, body parts are regarded as the matter of an animal and classified into two kinds : homogenous and non-homogenous. *Physis* is used to refer not to them directly but to characteristics of these parts, such as 'the nature of blood' (*PA* 650a1) or 'the nature of the pneuma' (*MA* 703a21–22), except when some non-homogeneous parts function as a single unit of several things, for which *physis* may be used. That *physis* is often treated as a periphrasis.

> Text-6 The nature (*physis*) of bones and the nature of blood vessels are alike. For each of them, having originated from one thing, is continuous ; and a bone on its own is nothing ; rather, it is a part either as part of something continuous or through contact and binding, . . . (*PA* 654a32–35, Lennox, 2001a)

'The nature of bones' is used multiple times in this chapter (e.g. 654a32, b12–13 ; 655a20). Lennox observes that what 'the nature of bones' refers to is the *single nature* of the skeletal bones by virtue of the fact that they function as a unit (Lennox, 2001a, p. 216). Similar expressions are used concerning various parts, such as blood vessels, teeth, hair, horns, intestines, and so on. For example, blood vessels are connected and can be perceived as one organ. Nonetheless, they are still classified into many different kinds as if there were several separate blood vessels. Intestines are similar to blood vessels. Aristotle mentions the colon as part of the intestines, a part assumed to be a cecum, and so on in *PA* 675a31–b12. This usage of *physis*[10] may also be said to function as a 'unifier' (Buchheim 2001).

This use of *physis* is also found in PA 646a13–24, where three stages of material aspects of an animal body are explained.

> Text-7 And yet, perhaps it is better to speak of composition from the potentials, . . . as stated previously in other works. That is, moist, dry, hot, and cold are matter (*hylê*) of the composite bodies, ... Second is the composition of the nature of the uniform parts (*hê tôn homoiomerôn physis*) within animals – e.g. of things. Third and last in the

10) It is difficult to translate the singular word *physis* with a plural noun of a body part in a manner in which the reader can easily assess what is being implied. If this word is literally translated into Japanese, it would be too unnatural for the reader to understand because nouns in Japanese are not singular or plural ; the phrase 'nature of bones' would be literally translated as 'things consisting of several bones'. Hence, the word *physis* here should be translated as *mono*.

series is the composition of the nature of the non-uniform parts – e.g. of face, hand, and such parts. (*PA* 646a12–24, Lennox, 2001a)

As quoted above, Lennox translates *physis* as 'nature' without clarifying its meaning. Pellegrin's and Kullmann's translations are largely similar[11], making it clear that *physis* is used here but avoiding specifying its meaning. Ogle does not indicate it clearly in his translation. When Peck translates it as 'the composition of the "uniform" substance', he repeats the subject of the sentence, i.e. composition (*systasis*), and appears to regard the *physis* as periphrasis. In translating these sentences, it is appropriate to translate *physis* as 'nature' without clearly indicating its implication to leave room for reader interpretation. However, it is not appropriate to treat the *physis* as a periphrasis, because Aristotle deliberately uses this expression.

The reason *physis* is used for the uniform and non-uniform parts while it is not used for the basic qualities such as moist, dry, hot, and cold, called the matter, is probably because the former depend on the organism they compose while the latter does not. The uniform and non-uniform parts assume the existence of an organism and, if they are cut off from an organism, can exist only in name. The *physis* is described both as an organism consisting of several uniform parts and as one consisting of several non-uniform parts. It is a unifier that brings several parts into one thing. The second and third of three compositions are the same organism described from different perspectives.

6. *Tsukuri* – Material structure of an animal body

The *physis* referring to the matter of an animal may also refer to the physical construction of an animal or its body parts. 'The original meaning of *physis* translated as "*tsukuri*" [make-up] is "*shizen*" or "*shizen-honsei*", but in this book [i.e. *HA*] it is often used to mean the physical structures and mechanisms that animals are born with' (Kaneko et al., 2015, p. 45).

Text-8 The internal structure (*physin*) of the interior of the ear is like the spiral-shells. (*HA* 492a16–17, Peck, 1965)

Text-9 . . . and hence we have to refer to those [i.e. the inner parts] of other animals, the natural structure (*physin*) of whose parts those of man resemble, and examine them. (*HA* 494b23–24, Peck, 1965)

11) Pellegrin (2011, p. 139) translates *hê tôn homoiomerôn physis* as *la nature des homéomères*, and Kullmann (2007, p. 32) translates it as *die (natürliche) Substanz (physis) der homogenen Teile*.

The *physis* in Text-8 and 9 can be classified as referring to the 'matter' of an animal, but it can also be seen as a formal nature, translated as *honsei*, as we will see next. If animal species are distinguished not only by their specific functions but also by their physical specialization, the physical construction can be regarded as a part of the form of an animal. It is important to refer to physical characteristics to explain the nature of each animal (Cf. Charles, 2000, pp. 330–333). There can be two species of animals that share the same bodily functions but differ markedly in their physical characteristics.

The contrast between form and matter is significant as a means of analysis, but a real animal is a reality with two kinds of aspects, rather than the union of two different kinds of reality, as supposed in Descartes' mind-body dualism. Hylomorphism describes such a relationship between form and matter. Gill argues that two kinds of hylomorphism can be found in *Metaph*. Z-Θ and that, '[a]s I understand Aristotle's proposal in H. 6, the proximate constituent matter of a hylomorphic complex is potential and indefinite, determinable like a genus, and substantial form differentiates the generic matter into some definite thing' (Gill, 2021, p. 185).

The two meanings of *physis* as form and matter are not only multiple meanings of one word but reflect the problem of the difference and identity in a reality. The *physis* translated as *tsukuri* suggests that the distinction between form and matter is not so clear-cut.

7. *Honsei*

Honsei, along with *shizen*, is one of main words used to translate 'nature'. In Japanese, a distinction must be made between natural objects (*shizen-butsu*) and the characteristic belonging to them[12], and the word *shizen* is not usually considered to refer to an individual natural object or its essential characteristic. Therefore, Japanese translators must make the difference clear, even when it would be possible to get away with ambiguity in English. They sometimes use *shizen-honsei* to suggest the link between the two.

Physis translated as *honsei* or *shizen-honsei* indicates the object to which it belongs, although it is not always explicitly stated. It is a relative concept, the specific content of which is determined by what goes into x in '*physis* of x'. In the case of an individual animal, it may refer to not only its formal nature but also its characteristic of its matter, such as its body part or material.

Text-10 The fish do not have distinct limbs, owing the fact that the nature (*physin*) of fish, according to the account of their substantial being, is to be able to swim. . . . (*PA*

12) For this reason, in discussing 'naturalism (*shizenshugi*, 自然主義)' or 'natural law (*shizen-hô*, 自然法)' for the general public, it is necessary to explain clearly what is meant by *shizen* (自然) there.

695b17–18, Lennox, 2001a)

> Text-11 The nature (*physis*) of the blood is the cause of many features of animals with respect to both character and perception, as is reasonable, since blood is the matter (*hylê*) of the entire body . . . . It therefore makes a great difference whether it is hot or cold, thin or thick, turbid or pure. (*PA* 651a12–17, Lennox, 2001a)

The *physis* in Text-10 refers to the essential function of fish – that is, their ability to swim – by which fish are distinguished from other animals. On the other hand, the *physis* in Text-11 refers to the physical properties of blood unique to each animal species. While blood is the matter for living organisms, its own essence is 'the final nutrient', but at issue here is the difference in its material property. Different animals have blood with their different properties, which is said to create differences in the character of animals. The physical quality of the matter in an animal species influences its character.

Another common usage of *physis* translated as *shizen-honsei* is 'naturally (*physei*)'. For example, 'natural objects' may be described as 'things constituted by nature' (PA 640b4), or 'some animals having a certain intrinsic nature' may be described as 'animals being naturally (*physei*) so and so'. For example, 'the brain is naturally (*physei*) the coldest part of the body . . .' (*GA* 783b28–29, Hett, 1912).

8. Two kinds of *kata physin*

The *physis* in the phrase *kata physin* (i.e. according to nature/in accordance with nature), whose counter expression is '*para physin*' (i.e. contrary to nature)', is also translated as *shizen-honsei*.

> Text-12 In them, however, it (i.e. superfetation) is contrary to nature (*para physin*) (that is why it injures the fetation) ; but in the animal we are discussing it is natural (*kata physin*), because that is the way in which that is the way in which their body took shape from the beginning. (*GA* 774a28–30, Peck, 1942)

Due to the physical structure (i.e. the size) of the uterus in women, superfetation is likely to injure the embryo. As it is a natural process to nurture the embryo without harming it, superfetation is contrary to the nature of women. In this case, it is appropriate to interpret *physis* as referring to the characteristics of the body structure of women. Conversely, in the category of the hare, the body structure is such that multiple births are possible and duplicate pregnancies are 'in accordance with its nature'.

Although the rationale is not always so clear, the phrase is used to describe a characteristic property of the animal in question. However, it is not required to be necessary for the animal.

> Text-13 . . . it happens either in every case or for the most part that is in accordance with nature. (*PA* 663b28–29, Lennox, 2001a)

The phrase *kata physin* is sometimes also translated as 'in accordance with *shizen-honsei*' and sometimes as 'in accordance with *shizen*'. Japanese translators feel that there are some cases in which the former translation is not suitable. In the former case, something whose nature matters is relatively clear, and the phrase means 'in accordance with *one's* nature'. Where this is not the case, *shizen* is used. In the next section, I will consider the case in which Aristotle used the two kinds of 'contrary to nature' contrastively.

In *GA* IV 4, Aristotle suggests ambiguity concerning *para physis* for the sake of argument. He maintains that the birth of a monster and its cause show that such inception is not contrary to nature.

> Text-14 For the monster is among the things that are contrary to nature (*tôn para physin ti*), not contrary to all nature (*para physin d' ou pasan*), though, but the one that holds for the most part (*tên hôs epi to polu*). For concerning the nature that is always and of necessity [the way it is] nothing comes to be contrary to nature, but rather it occurs among the things that, though they for the most part (*hôn epi to polu*) come to be in certain way, admit of doing so in another way. (*GA* 770b9–13, Reeve, 2019)

Here, Aristotle assumes that there are two kinds of *physis* (nature). If an animal, such as a sheep with the head of an ox, were born, it would be clearly contrary to nature. Such a monster cannot come into existence because of the difference in the period of gestation between different animals[13]. If the physical conditions necessary for an animal to be born are not in place, it cannot be born in the first place. As long as the physical conditions are in place for birth, the animal is not contrary to nature. However, it is said to be contrary to nature in that it looks very different from the normal appearance of the animal concerned. '[E]ven what is contrary to nature is a certain way in accord with nature' (*GA* 770b15–16, Reeve, 2019).

If the two kinds of *para physin* are to be differentiated, the *physis* contrary to which a

13) Cf. *GA* 769b13–25. Aristotle does not deny the possibility of the birth of hybrids.

monster is born would be translated as *honsei,* and the other would be referred to as *shizen*. However, since Aristotle himself makes use of ambiguity, the same word should be used for both *physis*.

The example of *kata physin* translated as 'in accordance with *shizen*' rather than 'in accordance with *shizen-honsei*' is presented below. When Aristotle says that the erect stature of humans is in accordance with nature, it cannot mean that humans stand upright according to their formal nature.

> Text-15 In man, above all other animals, the terms 'upper' and 'lower' are used in harmony with their natural position (*pros to kata physin topous*) ; for in him, upper and lower have the same meaning as when they are applied to the universe as a whole. In like manner the terms, 'in front', 'behind', 'right' and 'left', are used in accordance with their natural sense (*kata physin*). . . . but man alone, as has been said, has, in maturity, this part uppermost in respect to the material universe. (*HA* 494a26-b1, Thompson, 1910)

Standing upright is said to be according to nature. The upper part of a terrestrial animal is 'what is called "chest cavity", extending from the head to the residual outlet' (*PA* 686b5–6, Lennox, 2001a). Four-footed animals have a bodily construction 'as if they are continuously laying down since they have four underlying supports' (*PA* 689b18–19, Lennox, 2001a). For them, the upper part of the body is upper in a horizontal position but not in a vertical position. Only the heads of humans are located on top in both positions. According to Aristotle, the seat of human rationality is not the brain but the heart. Four-footed animals are in the present posture so that their soul can bear the weight of the upper part. Humans' bodies, on the other hand, are well constructed to bear it. The reason Aristotle thinks standing upright makes humans divine is unclear, but he thinks that such a natural posture shows human divinity in the sphere of nature. In *Cael.* 308a21–22, Aristotle says that we apply 'upper' to the extremity of the world, which is both uppermost in position and primary in nature (*physei*).

Aristotle says that humans are not only divine but also the most natural.

> Text-16 Two-footed animals, however, have their upper part lined up with the upper region of the universe because they are erect, and most of all the human being ; the reason is that the human being is the most natural (*malista . . . kata physin*) two-footed animal. (*IA* 706b9–10, Falcon and Stavrianeas, 2021)

The superlative with *kata physin* suggests that the word *physis* does not mean the formal

or material nature of humans here but seems to be a nature beyond any individual thing in the sublunary world. The *physis* refers to the order or the law in the natural world beyond individual species or an individual animal. 'What is in accord with nature (*to kata physin*) always has an order (*taxin*)' (GA 760a31, Reeve, 2019).

As mentioned above, the *physis* in *kata physin* is translated into Japanese as *shizen* or *honsei*. Which translation is chosen depends on the interpretation of the text in question. While the meaning of 'in according to nature (*honsei*)' is clearly understood, the nature in 'in according to nature (*shizen*)' is not so clear, but it is a clue to understanding the *physis* discussed in the next section.

9. 'The nature that crafted animals'[14)]

In biological books, with the exception of *HA*, *physis* is often used as the subject together with agency verbs such as *dêmiourgein* (to craft), *katachlêsthai* (to use), and *mêchanesthai* (to contrive). The expression concerned here is a variation of the craft analogy, which is found in *Ph*. 199a8–20[15)]. Aristotle explains his teleology by appealing to the idea of craft (*technê*) as an analogue for his notion of nature (*physis*) (Broadie, 1990). Aristotle's natural teleology should not only show that something is or comes to be for the sake of an end but also require causal explanation. A causal explanation that appeals to the concept of the agent as personalised, like the demiurge in Plato's *Tim*., is understandable. Aristotle explains how teleologically fitting the bodily construction of animals is for their survival and well-being as if nature had produced animals newly like an artist or a builder (*PA* 668a13–21). In *GA* II 6, he compares nature with a good household manager. 'For like a good household manager, nature too is not accustomed to throw[ing] anything away from which something useful can be made' (*GA* 744b16–17, Reeve, 2019). The ideal craftsman always aims to make good products objectively. Although some external factors may be a source of hindrance, the ideal craftsman 'does not deliberate' (*Ph*. 199b27) what he cannot fathom. Aristotle invokes 'a notion of craft (that is, the exercise of craft) in which psychological concepts play no essential part' (Broadie, 1990, p. 86). Thus, Ogle's translation of *physis* as 'the artistic spirit that designed them' cannot be admitted, because some psychological determinants are implied in the teleological explanation, which may distort Aristotle's intention (Broadie, 1990).

Lennox says that 'Aristotle's philosophical analysis of the concept "nature" in the *Phys.*, and reiterated in *PA* I 1, leaves no room for a Demiurgic or Cosmic Nature over and above the formal and material natures of specific natural substances' (Lennox, 2001c, p. 183).

14) *PA* 645a9, Lennox, 2001a.
15) Cf. *Meteor*. 381a9–12, b3–9, *PA* 639b15–21.

'Aristotle assumes nothing more than the formal and natures of individual substances in his explanatory repertoire' (Lennox, 2001c, p. 183). He argues that the concept of 'nature' used as a subject with agency verbs in *PA* is the formal natures.

In *PA* III 2, Aristotle explains why some animals have horns. First, he provides a teleological or functional explanation of having horns.

> Text-17 . . . for nature (*physis*) has provided some of them [i.e. viviparous animals] with claws, others with teeth fit for fighting, and still other with some other part sufficient for self-defense. (*PA* 662b33–34, Lennox, 2001a)

Self-defence for survival is crucial for animals, and survival is part of the formal nature of every animal along with reproduction. Still, this explanation is too abstract to explain the differences among animals. There are various possible modes of self-defence. Nature does not provide all animals with all features ; some are given with horns and others have claws. This nature (*physis*) seems to be a main factor determining which means for defence the animal in question has – horns, claws, or something else. In addition to the teleological explanation, Aristotle must provide the reason for the material condition of each animal.

> Text-18 (part of Text-1) We must now describe the character of that 'necessary nature' (*tês anankaias physeôs*), owing to which certain things are present of necessity, things to which have been used by 'rational nature' to subserve a 'purpose'. (*PA* 663b22–24, Peck, 1937)

Physis is divided into two kinds especially in this quotation. 'Rational nature'[16] refers to a formal nature in the limited sense, the function of which the animal has need. This is the means of difference in this case and does not refer to the form by which an animal is distinguished from other animals. What matters here is that the way the function is realized depends on the material conditions. The proper bodily characteristic of each animal is determined by the interplay of a 'rational nature' (*hê kata ton logon physis*) and a material nature. The explanation after the above quotation explains an animal having horns by pointing out the material conditions of horned animals. What is bodily and earthen is present in greater amounts in the larger animals for the most part. They can have a residual surplus, which may be distributed to the teeth, tusks, or horns. An animal does not need to have all of these features ; therefore, animals have one of these features and

16) Lennox (Lennox, 2001a) translates this phrase as 'the nature according to the account'. This expression is found only here.

not more.

> Text-19 . . . for nature takes [the surplus] from there and adds to the horns ; that is, the nourishment assigned to the upper front teeth expended in the growth of the horns. (*PA* 664a1–3, Lennox, 2001a)

Here, Aristotle explains the same concepts in two ways. While the latter focuses only on the transition of the material, the former takes the form of a causal explanation even though the cause is not clear. The former gives a teleological impression that the surplus is distributed for some reason. The *physis* in question seems to vaguely refer to various factors that determine the essential features of each animal[17]. Lennox regards this aspect as a formal nature. 'The view that makes best sense of this and many other similar passages is that the agent is the formal nature of the animals. Its actions distribute the materials of each animal (which *qua* materials are similar in animals within a kind) in just those ways appropriate for the animal's well-being as the form of animal it is' (Lennox, 2001c, p. 189). According to this explanation, deer have horns because they belong to the category of horned animals. Such a description is a type of Aristotle's explanation of biology (Lennox, 2001b).

While the formal nature of an animal in question determines its main features, one can find other determinants that explain why an animal has a particular feature. For example, the fact that an animal with horns is not explained by its being a horned animal but by its teleological function with its material condition. Teleologically, the feature seems to be good for the animal's well-being, which relates to the animal's way of living or its habitat. In *PA* IV 12, Aristotle explains differentiation among the birds, which is 'by means of excess or deficiency of their parts, and according to the more and less' (692b4–5, Lennox, 2001a). The necks, feet, beaks, and wings are said to differ 'in accordance with their ways of life' (693a11, Lennox, 2001a). For instance, some birds are long-legged because they have a marsh-dwelling way of life, and 'nature makes the instruments to fit the function, not the function to fit the instrument' (694b13–4, Lennox, 2001a).

One should not overestimate the agency of nature when nature is said to craft animals. The *physis* in question is ambiguous, and it is difficult to distinguish its referent from several possible alternatives. Rather, it is an amalgam of various factors that relate to the being of each animal, whether internal or external. When Aristotle reiterates the principle that 'nature makes nothing superfluous nor in vain'[18], he mentions only the principle

17) The expression that shows the agency of nature is not found in *HA*, which concentrates on factual and not causal descriptions of animals.

18) Cf. *de An.* 432b21–22, 434a31, *Cael.* 271a33, 291b13–14, *PA* 658a8–9, 661b23–24, 695b19, *IA* 704b15,

working in natural processes and indicates neither a particular object nor power as the 'nature'. The conception of this *physis* is one 'of nature which cannot be limited strictly to particular natures, taken independent from its environment and condition of existence' (Morel, 2016, p. 21).

The 'rational nature' in Text-18 is the nature envisaged as a stage before such concrete formal features of an animal in question are determined. It is the *physis* as a precondition for the determination of form of a concrete individual animal (except with regard to materials). The *physis* alone cannot determine the formal nature that distinguishes each animal from the others. It is formed by the interplay of the *physis* and the material condition (with the environment in which the animal is placed).

10. Conclusion

Aristotle uses the word *physis* with diverse meanings in his biological writings. It is almost impossible to express all the different meanings in Japanese translation. Moreover, if the differences in its meaning are always reflected in each translation, the significance of the fact that the word *physis* is expressed in a single word may be lost. This paper attempted to clarify Aristotle's intention in each usage of *physis* by translating it into Japanese as accurately as possible so that the reader is informed of the intention. In particular, we have examined the usage of *physis* in the context of hylomorphism, which Aristotle emphasises in his exploration of biology.

An organism is considered *physis*. Translating it as 'an animal' in this case might be natural for Japanese readers, but this would obscure the relation to other *physis*; therefore, it is translated as *shizen-butsu* (natural objects). Aristotle then points out that *physis* can be classified into formal and material nature. Based on this distinction, we first looked at examples of the use of *physis* as material nature. There are three levels of matter related to an animal, Aristotle explains, and the usage in which *physis* directly refers to matter at the elemental level can be confirmed. The *physis* that refers directly to homogeneous and non-homogeneous parts and is translated as *shizen-butsu* is not found except when some bodily parts composed of many parts are called the 'nature of parts'. The use of the word *physis* can be seen as similar in PA II 1, wherein *physis* works as a unifier and implies the close relationship between an organism as a whole and its matter.

Although Aristotle himself enumerates three kinds of matter, another kind of material description is found in which it is not fitting to translate *physis* as *shizen-butsu*. This is a description of a physical state of animal body and shows the specific characteristics of the

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708a9–10, 711a18, *GA* 739b19–20, 741b4–5, 744a36–37.

animal in question, so we translated it as *tsukuri* (make-up). 'Bodily organization', which some advocates of the neo-Aristotelian metaphysics regard as a form in hylomorphism (Lennox, 2021, pp. 233–235), can be seen to correspond to *tsukuri*. This suggests that the *physis* remembers formal nature.

Regarding formal nature, on the other hand, the *physis* indicates 'the nature of something', which refers to an essential or main feature of a thing. Interesting in such usage is *kata physin* or *para physin*. The *physis* in these phrases is often translated as *shizen-honsei*. However, there are cases in which this is not appropriate, and translators translate it as *shizen*, referring to the order or law found in the natural world. Such a conception of *physis* leads to an understanding of *physis* in phrases such as 'nature makes use of x'. The 'rational nature' (*hê kata logon physis*) referred to in Text-18 is that animals need something to provide a means of protection. Expressions such as 'nature makes use of x' could be rewritten as a description without nature as the subject and with *kata physin* added, although the intended teleological aspect could be de-emphasised. If one follows Lennox's interpretation, the phrase is regarded as *kata physin* (*shizen-honsei*), but according to ours, it is *kata physin* (*shizen*). The *shizen* includes the environment in which the animal species is situated, its way of life, and so on as factors that determine its essential nature. Such *shizen*, in interrelation with the material conditions of the animal species in question, determines their unique characteristics. In this light, it becomes clear that Aristotle's hylomorphism is a dynamic concept.

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References

[Texts and translations of Aristotle]

Balme, D. M. (tr.) (1992) *Aristotle, De Partibus Animalium I and De Generatione Animalium I (with passages from II. 1–3)*, with a report on recent work and an additional bibliography by A. Gotthelf. Oxford : Clarendon Press

Charlton, W. (tr.) (1970) *Aristotle's Physics, Books I and II*. Oxford : Oxford University Press

Falcon, A. and S. Stavrianeas (eds. and tr.) (2021) *Aristotle on How Animals Move : The De Incessu Animalium : Text, Translation and Interpretative Essays*. Cambridge : Cambridge University Press

Hamaoka, T. (tr.) (2016) 'On the Parts of Animals'. in Uchiyama, K., S. Kanzaki and M. Nakahata (eds.) *Complete Works of Aristotle*, Vol. 10. Tokyo : Iwanami Shoten (濱岡剛 (訳) (2016)「動物の諸部分について」, 内山勝利・神崎繁・中畑正志 (編)『アリストテレス全集』第10巻・東京：岩波書店)

Hardy, R. P. and R. K. Gaye (1930) 'Physica'. in Smith, J. and Ross, W. D. (eds.) *The Works of Aristotle,* Vol. 2. Oxford : Clarendon Press

Hett, A. (tr.) (1912) 'De Generatione Animalium'. in Smith, J. and Ross, W. D. (eds.) *The Works of Aristotle,* Vol. 5. Oxford : Clarendon Press

Kaneko, Y., M. Ito, O. Kanazawa and T. Hamaoka (tr.) (2015), 'History of Animals' 1st vol., *Complete Works*

of Aristotle, Vol. 8. Tokyo : Iwanami Shoten（金子善彦・伊藤雅巳・金澤修・濱岡剛（訳）（2015）「動物誌（上）」，内山勝利・神崎繁・中畑正志（編）『アリストテレス全集』第 8 巻，東京：岩波書店）

Kullmann, W. (tr.) (2007) *Aristoteles, Über die Teile der Lebewesen, Aristoteles Werke in deutscher Üvesetzung, Band 17, Tei1 7*. Darmstadt : Wissenschaftliche Buchgesellschaft

Lefebvre, D. (tr.) (2014) 'La Génération des Animaux'. in Pellegrin, P. (ed.) *Œuvres Complètes*. Paris: Flammarion

Lennox, J. G. (tr.) (2001a) *Aristotle, On the Parts of Animals*, Oxford : Clarendon Press

Nagai, T. (tr.) (2016) 'On Progression of Animals'. in *Complete Works of Aristotle*, Vol. 10, Tokyo : Iwanami Shoten（永井龍男（訳）（2016）「動物の進行について」，内山勝利・神崎繁・中畑正志（編）『アリストテレス全集』第10巻，東京：岩波書店）

Ogle, W. (tr.) (1912) 'De Partibus Animalium'. in Smith, J. and Ross, W. D. (eds.) *The Works of Aristotle, Vol. 5*. Oxford : Clarendon Press

Peck, A. L. (ed. and tr.) (1937) *Aristotle, Parts of Animals, Movement of Animals, Progression of Animals*. Cambridge, Mass : Harvard University Press

Peck, A. L. (ed. and tr.) (1942) *Aristotle, Generation of Animals*. Cambridge, Mass : Harvard University Press

Peck, A. L. (ed. and tr.) (1965) A*ristotle, History of Animals, Book I–III.* Cambridge, Mass : Harvard University Press

Pellegrin, P. (2011) *Aristote, Les Parties des Animaux*. Paris : Flammarion

Primavesi, O. and B. Morison (eds. and tr.) (2020) *Aristotelis De Motu Animalium*. Oxford : Oxford University Press

Reeve, C. D. C. (tr.) (2019) *Aristotle, Generation of Animals & History of Animals I, Parts of Animals I*. Indianapolis : Hackett Publishing Company

Sakashita, K. (tr.) (2005) *Aristotle, On the Parts of Animals, On the Movement of Animals, On Progression of Animals*. Kyoto : Kyôto-daigaku Gakujutsu Shuppan-kai（坂下浩司（訳）（2005）『アリストテレス動物部分論，動物運動論，動物進行論』，京都：京都大学学術出版会）

Simazaki, S. (tr.) (1969a) 'On the Parts of Animals'. in Ide, T. and Yamamoto, M. (eds.) *Complete Works of Aristotle,* Vol. 8. Tokyo : Iwanami-shoten（島崎三郎（訳）（1969）「動物部分論」出隆・山本光雄（編）『アリストテレス全集』第 8 巻，東京：岩波書店）

Simazaki, S. (tr.) (1969b) 'On the Progression of Animals'. in Ide, T. and Yamamoto, M. (eds.) *Complete Works of Aristotle*, *Vol. 9*. Tokyo : Iwanami Shoten（島崎三郎（訳）（1969）「動物進行論」，出隆・山本光雄（編）『アリストテレス全集』第 9 巻，東京：岩波書店）

Simazaki, S. (tr.) (1969c) 'On Generation of Animals'. in *Complete Works of Aristotle*, *Vol. 9*. Tokyo : Iwanami Shoten（島崎三郎（訳）（1969）「動物発生論」，出隆・山本光雄（編）『アリストテレス全集』第 9 巻，東京：岩波書店）

Thompson, D. W. (tr.) (1910) 'Historia Animalium'. in Smith, J. and Ross, W. D. (eds.) *The Works of Aristotle,* Vol. 4. Oxford : Clarendon Press

Waterfield, R. (tr.) (1999) *Aristotle, Physics*. Oxford : Oxford University Press

[Other books and articles]

Broadie, S. (1990) 'Nature and Craft in Aristotelian Teleology'. in *Aristotle and Beyond : Essays on Metaphysics and Ethics.* Cambridge : Cambridge University Press, pp. 85–100

Buchheim, T. (2001) 'The Functions of the Concept of *Physis* in Aristotle's Metaphysics'. *Oxford Studies in Ancient Philosophy* 20, pp. 201–234

Charles, D. (2000) *Aristotle on Meaning and Essence*. Oxford : Oxford University Press

Collingwood, R. G. (1945) *The Idea of Nature.* Oxford : Clarendon Press

Gill, M. L. (2021) 'Aristotles Hylomorphism Reconceived'. *Proceedings of the Aristotelian Society. New Series* 121, pp. 183–201

Lennox, J. G. (2001b) 'Divide and Explain : The *Posterior Analytics* in Practice'. in *Aristotle's Philosophy of Biology : Studies in the Origins of Life Science*. Cambridge : Cambridge University Press, pp. 7–38

Lennox, J. G. (2001c) 'Material and Formal Natures in Aristotle's *De Partibus Animalium*'. in *Aristotle's*

Philosophy of Biology : Studies in the Origins of Life Science. Cambridge : Cambridge University Press, pp. 182–204

Lennox, J. G. (2021) 'Form as Cause and the Formal Cause : Aristotle's Answer'. In Jansen, L. and Sandstad (eds.), *Neo-Aristotelian Perspectives on Formal Causation*. London : Routledge, pp. 225–237

Maruyama, M. (1998) *Loyalty and Treason*. Tokyo : Chikuma-shobô (丸山真男 (1998)『忠誠と反逆』, 東京, 筑摩書房 (単行本1992))

Morel, P.-M. (2016) '"La nature ne fait rien en vain" : Sur la causalité finale dans la Locomotion des animaux d'Aristote', *Philosophie Antique* 16, pp. 9–30

Pym, A. (2014) *Exploring Translation Theories*, 2nd ed. London : Routledge

Sagara, T. (1989) *Japanese Thought : Reason, Nature, Way, Heaven, Mind, Tradition*. Tokyo : Perikan-sha (相良享 (1989)『日本の思想　理・自然・道・天・心・伝統』, ぺりかん社)

Shogaku-kan Kokugo-jiten Henshû-bu (2000) (ed.) *Japanese Dictionary,* 2nd ed. Tokyo : Shôgaku-kan (小学館国語辞典編集部 (2000)『日本国語大辞典』第 2 版, 東京 : 小学館)

Tanaka, M. (1986) 'Natural Object, Nature and Natural World'. in *Investigation from philosophical Viewpoint : Nature and Man*. Tokyo : Iwanami-shoten (田中美知太郎 (1986)「自然物, 自然, 自然界」『哲学からの考察—自然と人間』, 東京, 岩波書店)

Vinay, J.-P. and Darbelnet, J. (1995) *Comparative Stylistics of French and English : A Methodology for Translation*. Translated from the French by J. Sager and M.-J. Hamel. Amsterdam and Philadelphia : John Benjamins

Wardy, R. (2000) *Aristotle in China : Language, Categories and Translation*. Cambridge : Cambridge University Press

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