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TRANSLATION TECHNIQUES USED IN BIOLOGICAL TERMS IN BILINGUAL BIOLOGY 1 TEXTBOOK FOR SENIOR HIGH SCHOOL CLASS X

[1]Vibry Andina Nurhidayah*
[1]Institut Agama Islam Negeri Pontianak, Indonesia
[1]vibrynur@gmail.com

[2]Maksud Khoshimov
[2]Indonesian Embassy, Uzbekistan
[2]mhoshimov8927@gmail.com

*Corresponding author

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Abstract: This article investigates the translation of English biological terms into Indonesian in a high school textbook. Using a descriptive-qualitative approach, it examines translation techniques, drawing on Molina and Albir's framework. Data collection methods include content analysis. The study identifies four translation techniques: pure borrowing, literal, borrowing, and amplification. Pure borrowing is the most common technique used. The discussion emphasizes the importance of balancing linguistic accuracy and cultural relevance. The research contributes to understanding translation strategies in cross-cultural communication, aligning with Molina and Albir's framework. Overall, it sheds light on translators' choices in conveying biological concepts in bilingual education.

Keywords: *biological terms, senior high school biology textbook, translation study*

INTRODUCTION

Nowadays, schools and tutoring centers in Indonesia offer bilingual classes. A bilingual class is one where both English and Indonesian are used as the language of instruction and where the subject matter is presented in both languages. Not all subjects in a bilingual class use English, but only math, English and natural science. Biology lessons are part of natural science lessons and therefore the learning materials use bilingual books. Learning materials in bilingual books present two languages, the source language abbreviated to SL and the target language abbreviated to TL, this is where a

translator plays an important role. He must be able to translate the source language into the target language accuracy, acceptability, in accordance with the word equivalent from the biological terms of the source language to the biological terms of the target language.

The process of translating entails understanding the source text's grammar and linguistic structure, doing a semantic analysis, and having a thorough comprehension of it to spot any idioms (Ma'ruf et al., 2023). In the process of translating from the source language (SL) to the target language (TL), consider the example where the SL states that a molecule is the smallest unit in which two or more atoms of the same or different elements are bound together. The corresponding TL translation reads, "Molekul adalah unit terkecil yang terdiri atas dua atau lebih ikatan atom." Here, the translator employs various techniques, such as adaptation to align the concept within the cultural context of the target language. Additionally, the translator uses linguistic compression to convey the message concisely in the TL. The translated paragraph effectively captures the essence of the original statement, ensuring clarity and coherence while addressing the linguistic and cultural nuances of the target audience.

The example provided illustrates the application of the literal translation technique in translating the biological term "Molecule" from the source language to "Molekul" in the target language. However, achieving accurate translations of biological terms in bilingual biology textbooks involves a nuanced exploration of various methods and techniques. A thorough examination of bilingual biology books is imperative to understand the translator's choices in terms of methods and techniques, including the determination of suitable word equivalents. Translators often draw upon multiple language sources, including Indonesian, Malay, Nusantara languages, and foreign languages like English and Arabic, to enrich the Indonesian vocabulary. The absorption and adaptation of terms from different linguistic sources contribute to the evolution of specialized language in biology education materials.

The translation process involves the study of the lexicon, grammatical structure, communication situation and cultural context of the source language text. The classification of translation into form-based and meaning-based further informs the translator's approach. Form-based translation, similar to literal translation, closely follows the structure of the source language, while meaning-based translation, often referred to as idiomatic translation, prioritises the natural communication of the source language text

in the target language. These differences provide insight into the different strategies used by translators to effectively convey the essence of biological terms.

Drawing parallels with related research, such as Mohammed (2023) research about discourse-based Qur'an translation study and research by Rachmawati (2017) that conducted an analysis of foreign terms in dictionaries, offers valuable perspectives on translation processes. These studies emphasize the importance of adapting translations to the socio-cultural context and mode of thought-culture of the target audience.

In this research, specifically focusing on the translation of biological terms in the Bilingual Biology 1 For Senior High School Class X book, aims to identify the dominant translation technique employed by translators. Understanding the rationale behind the chosen technique is crucial in unveiling the intricate dynamics of translating specialized terminology in the realm of biology education.

REVIEW OF LITERATURE

Definiton of Translation

Based on *Kamus Besar Bahasa Indonesia (KBBI)*, translation is the process, action, or manner of translating; interpretation. Moreover, based on the Oxford Learner's Dictionary, translation is an act, process, or instance of translating. Catford in (Mohammed (2023) defines translation as a relationship between languages; as such, studying translation in isolation from linguistics is unseasonable.

Translation tasks involve more than one language, each with its own set of conventions and characteristics. Changes in form and meaning may occur during the transfer process from the source language (SL) to the target language (TL). Therefore, the translator must become skilled at identifying the best match during the translation process in order to produce a translation that is both accurate and appropriate (Mulya et al., 2023). Moreoevr, the translation process is examined using keystroke recording, user activity software, and eye tracking technology (Mohammed, 2023).

Famed American linguist Eugene A. Nida proposed the theory of functional equivalency (Yanli, 2023). Translation should aim for functional equivalency between two languages rather than excessive grammatical accuracy and text correspondence. This means that translated content should be functionally equivalent to its source language. Functional equivalency values readers of the target language's response. Nida highlights

that readers of the target language should react to the target text in a manner that is essentially similar to that of readers of the original text. The functional equivalency theory proposed by Nida can achieve functional equivalency to a large degree by reducing the objective criteria for the conversion between the source and target languages. The main strategies for accurately reflecting the content and meaning of the source language in translation activities are appropriate, natural, and equivalent ways. Equivalency should be reached in the particular translation process at the lexical, syntactic, textual, and stylistic levels.

In the last thirty years or so, the idea of translation has evolved within the framework of what is now called the "sociological turn" (Wolf and Fukari in Zheng et al., 2023). In order to understand the shift, it would be beneficial to adopt sociological paradigms for studying the social sciences. Three main strategies are used. A macro-structure that directs the behaviour of individual agents can be studied as society. Alternatively, society can be seen from the other perspective, that is, from the bottom up, where social institutions are constantly being negotiated by individual agents. In the end, an attempt is made to arrive at a balanced perspective because social practices are not easily explained by either the first or the second paradigm alone. All three methods have been used in the study of the social aspects of translation.

In conclusion, translation plays a crucial role in conveying ideas between languages, especially in disciplines like biology. Bilingual biology textbooks require careful selection of equivalent terms to ensure accuracy and comprehension. Translators must employ special techniques and avoid forcing exact equivalents when they're elusive. In schools with bilingual classes, such as those teaching both English and Indonesian, translators play a vital role in ensuring effective instruction in subjects like biology. This study examines the translation of biological terms from English to Indonesian, focusing on techniques used by the translators.

Translation Techniques

The process by which a translator transfers a word from its original language into the text of the target language is called transference. This includes transliteralism, which is concerned with altering the alphabet. Newmark (1988) in Eskandari et al., (2023) emphasizes the importance of choosing a translation method based on the target audience and the purpose of translation. Translation methods as global options influencing the

entire text, with eight methods oriented to the source language and four to the target language.

Equivalence, a central concern in translation theory, presents challenges in finding suitable word equivalents between source and target languages. Problems of translatability and untranslatability arise, with Nababan stressing the need for similarities between the concepts of source and target languages. Types of equivalence, including linguistic, paradigmatic, stylistic, and textual equivalence.

The discussion extends to translation techniques, classified by Molina and Albir into 18 categories such as adaptation, borrowing, and literal translation. Each technique influences the translation result, operates at the micro level, and serves functional purposes. In the context of biological term translation, these techniques play a vital role in addressing challenges related to language and cultural nuances. The choice and application of these techniques impact the overall content and clarity of biological term translations in bilingual biology textbooks.

First, adaptation translation technique. Adaptation is a translation strategy that substitutes a phrase or expression from the source language with one that is more acceptable or common in the target language culture (Molina & Hurtado, 2002). The translation method known as adaptation involves substituting acceptable and recognised parts of the source language with parts of the target language (Volf, 2020). In adaptation, the translator makes adjustments or substitutions in the translation process to ensure that the translated text conforms to the linguistic and cultural norms of the target language. This involves modifying certain elements of the source language to better fit the conventions of the target language.

Secondly, Borrowing technique. Borrowing technique is a term directly borrowed from another language, without translation, from the source language into the target language (Molina & Hurtado, 2002). Taking a word or expression from the original language is known as borrowing (Volf, 2020). This borrowing can take two forms: borrowing (taken to the target language's morphology and phonetic system) and pure borrowing (also known as pure borrowing). This form of borrowing involves adapting the borrowed word to fit the morphology and phonetic system of the target language. For example, taking an English word and modifying its form to fit the grammatical and phonetic rules of the target language. Pure Borrowing, this form involves importing a

word directly from the source language without changing its form. The borrowed word retains its original structure and pronunciation.

Third, the literal translation technique. When two languages are precisely equivalent in terms of structure, lexicon, and even morphology, this is known as literal translation (Molina & Hurtado, 2002). It involves translating a sentence word for word while maintaining the target language's structural integrity (Volf, 2020). In literal translation, the emphasis is on maintaining the exact words and order of the original text. This method is used when adherence to the original wording is considered important, and often prioritises linguistic accuracy over naturalness. However, it can sometimes result in expressions that are awkward or less idiomatic in the target language.

In summary, adaptation, borrowing, and literal translation are key methods in translation, each suited to different contexts and needs. The research focuses on translating English biological terms into Indonesian within a class X bilingual biology textbook, using a qualitative approach. The chosen methodology is the agih method, focusing on precise translation. Three techniques are employed. First, elicitation. Actively gathering insights from experts or proficient individuals to ensure accurate translations. Second, the researcher used Class X Biology Bilingual Textbook (2012) and Indonesian Dictionary in order to referring to these resources for comparison and accuracy. Third, recording or transcription which systematically documenting translated terms to analyze patterns and variations.

Biology Subject

Biology, also known as life science, is the study of the physical aspects of life. The term biology comes from the Dutch language, biologie, which comes from a combination of Greek words, bios which means life and logos which means symbol, knowledge. The term life science is derived and adapted from Arabic, also meaning the science of life. The objects of biological studies today are very broad and include all orders of living things in various aspects of their lives, and the biological terms used will be very diverse and interesting to study. This lesson deals with biological terms in it, which makes it interesting to study their meaning in Indonesian. This study covers how biological terms are translated, what techniques are used, what methods are retained and what ideology is used by the translator.

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In translating a term used in biology, the first problem that arises is that the choice of the right word is the first thing that a translator has to deal with before worrying about the form. In a translation case, it is the translator's job to find the right word choice so that the idea intended by the writer or speaker can be accurately perceived by the reader or listener of a translated text.

Related to the explanation of the accuracy of word choice described above, the equivalent must be natural in other words, natural, in accordance with the idiom of the target language itself. Similarly, the translation of biological terms must be appropriate when read by learners and readers of the target language.

Translation is not only about changing the source language text, in this case the biological terms of the source language into the target language text, but also the purity of the content of the ideas and thoughts of the writer must still be conveyed to the target language readers. The news conveyed by the translator to the target reader must be close to the original so that the reader really receives the message conveyed by the writer without any reduction and addition of messages that will obscure the ideas and thoughts of the writer. In addition, a translator must master the language, namely the source language and the target language.

Language here also involves scientific terms in the source language, and this will be a difficulty for a translator. A term must be translated correctly into the target language in order to produce the same meaning as the source language. Similarly, in translating biological terms in a textbook, the translator's task is also to select and find the equivalent of a term with the right choice of words, the problem of selecting the right choice of words and commensurate with biological terms is a difficult thing to do.

If there is something that must be maintained in translating the source language into another language or target language is the meaning or message contained in the language. This is in accordance with Larson's opinion in (Yugasmara, 2010) which states that "naturally and supposedly, what changes is the form and the code and what should remain unchanged is the meaning and the message", meaning that the meaning contained in a translated text, a linguistic unit must be given equivalently in any translation into any target language.

Catford in Asmarani (2008) defines translation as; "translation may be defined as the replacement of textual material in one language (SL), by textual material in another

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language". The definition of translation presented here assumes that the translation process is only a process of replacing the source language text into the target language text. Furthermore, translation is not only a process of replacement but also a process of transferring the thoughts and ideas of the writer, in this case the translator, from the source language terms into the target language terms both in writing and orally. There are many biological terms that are difficult to find equivalents for, what appropriate methods should be used by the translator so that the translation results can be understood and comprehended in the target language.

METHOD

The research aimed to understand translation techniques in the "Bilingual Biology 1 For Senior High School Class X" book using a descriptive-qualitative approach. It focused on linguistic aspects like words, phrases, clauses, and sentences. Data collection involved noninteractive methods like questionnaires and document analysis, and interactive methods like in-depth interviews. Content analysis was the primary focus, examining the translation of biological terms to identify patterns. The study used the agih method, selecting English biological terms for precise translation into Indonesian.

Data collection included note-taking and recording English biological terms translated into Indonesian. Analysis involved categorizing translation techniques and presenting findings in a formal report. Overall, the research combined noninteractive and interactive approaches, emphasizing content analysis and translation techniques to understand the process in the "Bilingual Biology 1 For Senior High School Class X" book.

FINDINGS AND DISCUSSION

Findings

The data used in this study were the data contained in the book Bilingual Biology 1 for Senior High school Year X written by Drs. Arif Priadi, M.Ed. in English which is translated into Indonesian by Niken, et al. published by Yudhistira. The study of this research is in the form of words, phrases, clauses and sentences. In this analysis, the researcher refers to the translation techniques proposed by Molina and Albir. This is done because the theory is more complete and more detailed than the theory of translation techniques proposed by other experts. In the data of translation techniques that appear in

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the Bilingual Biology for Senior High School Year X book, there are 105 data of biological terms consisting of 5 types of translation techniques such as pure borrowing 31 (29.52%) data, borrowing 4 (3.80%), literal 16 (15.23%) and amplification 2 (1.90%). The following table shows the data of the translation technique findings.

Table 1. the data of the translation technique findings

Translation technique	Number of data	Percentage
The pure borrowing	31	29,52%
The borrowing	4	3,80%
The literal	16	15,23%
the amplification	2	1,90 %

The translation technique with the highest percentage is the pure borrowing translation technique with 31 data, followed by the literal translation technique with 16 data, the borrowing translation technique with 4 data and the least data that appears based on the analysis is the amplification translation technique with 2 data.

Pure borrowing translation technique

For the pure borrowing translation technique, it is a direct borrowing without making any changes to the target language. There are 31 data or 29.52%. The following is an example of data review:

- Source Language (SL): At the molecule level, biology studies **DNA (deoxyribonucleic acid)** and **RNA (ribonucleic acid)** that involved in protein synthesis.
- Target Language (TL): *Biologi pada tingkat molekul, diantaranya memaparkan tentang* **DNA (deoxyribonucleic acid)** *dan* **RNA (ribonucleic acid)** *yang terlibat dalam sintesis protein.*

There are 2 data of biological terms in the source language of the sentence above, namely **DNA (deoxyribonucleic acid)** and **RNA (ribonucleic acid)** which are translated with the same translation in the target language, namely **DNA (deoxyribonucleic acid)** and **RNA (ribonucleic acid).** Another example of data that uses the pure borrowing translation technique is:

- SL: Those organism were named as **tobacco mosaic viruses (TMV).**
- TL: *Organisme tersebut diberi nama* **tobacco mosaic viruses (TMV).**

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The translation data of the biological term above translates the target language by still writing the same virus name as the source language for this technique is classified into pure borrowing.

Literal translation technique

This technique translates a word or expression in the source language literally, that is, one word does not have to be matched with one word in the target language and the translation is adjusted to the target language rules. There are 16 data or 15.23%. The following is the data of the translation findings:

- SL: **ecosystem diversity** is the diversity found among the ecosystems.
- TL: ***keanekaragaman ekosistem*** *adalah keanekaragaman yang dapat ditemukan diantara ekosistem.*

The biological term above is one of the findings that uses the literal translation technique by translating according to the target language. The other findings are:

- SL: branches of biology which classified based on aspect of life are **reproduction knowledge, biology development, …**
- TL: cabang-cabang biologi berdasarkan aspek kehidupan yang dipelajari antara lain **ilmu reproduksi, biologi perkembangan,..**

There are 2 data of biological terms translated using the literal translation technique in the sentence above, namely **reproduction knowledge** which is translated into ***ilmu reproduksi*** and **biology development** which is translated into **biologi perkembangan**. Examples of other findings are as follows:

- SL: branches of biology which classified based on its application, are biochemistry, biophysics, biogeography, bioinformatics, agronomy, **plant cultivation**, **soil science,** phytopatolgy, **weed science**, holticulture, **cross breed science**, **the science of livestock reproduction**, **forest science**, **agroforestry**, **natural resources conservation**, **fishery science**, **veterinarian science**, **medical science**, biotechnology, **genetic engineering**, pathology and **dentist science.**
- TL: *cabang-cabang biologi yang termasuk ilmu terapan,antara lain biokomia, biofisika,biogeography, bioinformatika, agronomi,****ilmu budidaya tanaman****, **ilmu tanah**, fitopatologi, **ilmu gulma**, holtikultura, **ilmu pemuliaan**, **ilmu produksi ternak**, **ilmu kehutanan**, **ilmu budidaya hutan**, **konservasi sumber daya alam, ilmu**

perikanan, ***ilmu kedokteran hewan***, ***ilmu kedokteran***, *bioteknologi*, ***rekayasa genetic***, *patologi dan* ***ilmu kedokteran gigi.***

There are 13 biological terms in the sentence above that are translated using the literal translation technique, namely **plant cultivation** translated into ***ilmu budidaya tanaman***, **soil science** translated into ***ilmu tanah***, **weed science** translated into ***ilmu gulma***, **cross breed science** science translated into ***ilmu pemuliaan*****, the science of livestock** translated into ***ilmu produksi ternak***, **forest science** translated into ***ilmu kehutanan***, **agroforestry** which translates to ***ilmu budidaya hutan***, **natural resources conservation** which translates to ***konservasi sumber daya alam***, **fishery science** which translates to ***ilmu perikanan***, **veterinarian science** which translates to ***ilmu kedokteran hewan*****, medical science** which translates to ***ilmu kedokteran***, **genetic engineering** which translates to ***rekayasa genetic***, and **dentist science** which translates to ***ilmu kedokteran gigi***.

Borrowing translation technique

Next is the borrowing translation technique which produces 4 data or 3.80%. Here are the data findings:

- SL: **organel** can be found inside a cell with specific functions.
- TL: **organel** *dengan fungsi tertentu dapat ditemukan dalam sel.*

In the sentence above, the source language word organel is translated into organel in the target language because the target language does not find the same concept, so the translator chooses to use the borrowing technique.

- SL: they are stabile at **pH** 5.0 to 9.0
- TL: *biasanya stabil pada* ***pH*** *5.0 sampai 9.0*

The sentence of the source language **pH** above is translated **pH** in the target language by using the borrowing technique, which is still taking foreign terms directly without making any changes. What is meant by **pH** stands for potential of hydrogen or translated into target language is the degree of acidity used to express the level of acidity or basicity possessed by a solution.

- SL: conservation can be done on original habitat (in situ) or outside the original habitat (ex situ)

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- TL: usaha pelestarian dapat dilakukan dihabitat asli (in situ) ataupun diluar habitat asli (ex situ).

The sentence above contains the terms **in situ** and **ex situ** which are used in the target language while still borrowing the source language **in situ** and **ex situ**. For this reason, the borrowing technique is used to translate both terms.

Amplification translation technique

Translation techniques involve adding detailed information that is not in the source language text. What is added is only information that can help convey messages or increase the understanding of target language readers by not changing the message in the original language text or source language. There are 2 data or 1.90%, the source language is **population** and **plasmodium** which is translated in the target language by adding more information using brackets "(..)". Here are the data findings:

- SL: **population** is a group of individual of the same kind. Occupying a given area.
- TL: **populasi** *(kelompok yang sama speciesnya atau satu species)yang hidup ditempat tertentu.*

Other data findings are as follows:

- SL: **plasmodium** produces sporangium consisting spores.
- TL: **plasmodium** (*massa sitoplasma tunggal yang tidak dibagi oleh membrane dan mengandung banyak nucleus) membentuk banyak sporangium penghasil spora.*

Discussion

The analysis of translation techniques in the book "Bilingual Biology 1 for Senior High School Year X" provides valuable insights into the strategies employed in rendering biological terms from English to Indonesian. The study, focusing on words, phrases, clauses, and sentences, draws on Molina and Albir's translation techniques to categorize the data. With 105 instances of biological terms analyzed, the predominant techniques identified are pure borrowing, literal, borrowing, and amplification.

Borrowing takes a word from the source language as is (Kho et al., 2024). Pure borrowing is the second most common technique at 29.52%, involves directly adopting foreign terms without alteration. Because the translators take a word or expression directly from the original language, the translator employed borrowing translation techniques (Pratama et al., 2024). The data include instances like the translation of "DNA

(deoxyribonucleic acid) and RNA (ribonucleic acid)," where the terms are borrowed as is, maintaining their original form in Indonesian.

The literal translation technique, accounting for 15.23% of the data, involves translating words or expressions directly, adhering to the rules of the target language. An example is the translation of "ecosystem diversity is the diversity found among the ecosystems," where the term "ecosystem diversity" is translated literally to "keanekaragaman tingkat ekosistem."

The borrowing technique, with 3.80% of instances, is used when there is no equivalent term in the target language. For instance, the term "organel" is borrowed directly into Indonesian as "organel."

The amplification technique, with 1.90% of instances, involves adding detailed information to enhance understanding without changing the original message. amplification technique that entails making some parts of the translated text explicitly known that were implied in the original (Ripoll, 2021). To make a translated text simpler to grasp for the intended audience, a definition or explanation of the original phrase is added. This technique may be categorised as a form of paraphrasing. Examples include the translation of "population" and "plasmodium," where additional information is enclosed in parentheses to provide clarity.

The intricacy of stylistic writing must be overcome with the use of translation techniques. A translation technique is a way of communicating ideas at the word, phrase, clause, or sentence level from the source language to the target language (Simanjuntak et al., 2021). The translation techniques identified in this analysis align with Molina and Albir's framework, showcasing the versatility of strategies employed by the translator. The prominence of pure borrowing reflects the translator's balance between linguistic accuracy and cultural relevance. The use of literal translation highlights instances where a word-for-word correspondence is deemed appropriate, while borrowing and amplification are applied judiciously in the absence of direct equivalents or for added clarity.

This study contributes to the ongoing discourse on translation strategies, emphasizing the importance of context, linguistic nuances, and cultural considerations in achieving effective cross-cultural communication. As theory by Molina and Albir, the translator's decisions are not arbitrary but guided by a nuanced understanding of both

source and target languages. These findings align with the broader scholarly conversation on translation theory and practice, emphasizing the dynamic and multifaceted nature of the translation process.

CONCLUSIONS AND SUGGESTIONS

Conclusions

Based on the analysis conducted on the book "Bilingual Biology 1 for Senior High School Class X," it can be identified that there are five types of translation techniques that are dominantly used to translate biological terms, namely pure borrowing, literal, borrowing, and amplification. In order, the most dominant translation technique is the pure borrowing, followed by literal, borrowing, and amplification. The importance of language and terminology in a scientific discipline is the main highlight in translating biological terms. A translator is faced with the demand to master various languages and vocabularies in a particular discipline. This is particularly evident in translating biological terms in the context of bilingual textbooks. A translator needs to have the ability to find the right match between the source and target language terms. It is important to note that if a word or term does not have an equivalent in the target language, the translator should not insist on finding an equivalent. This is to ensure the quality of the translation and maintain the unity of meaning in the context of Biology in both languages.

Suggestions

The suggestions aim to make translating scientific terms for bilingual education better. First, we need more research to understand how well translations work for teachers and students, and we should gather feedback for improvement. Translators should be well-trained in both languages and the subject, focusing on the challenges of scientific terms. Collaboration among publishers, education groups, and experts is essential for quality assurance in translated textbooks. Using technology tools can make translations faster and more accurate. Exploring similar challenges in other sciences through cross-disciplinary research can help us understand translating scientific content better. Long-term studies can check how well translated materials impact students.

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