Journal of Psycholinguistic Research (2023) 52:2661–2676
https://doi.org/10.1007/s10936-023-10013-0

The Effect of the Linguistic Status of Text Previewing in Arabic on the Reading Comprehension Outcomes Among Second and Sixth Grade Native Arabs Readers: A Cross-Sectional View

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Accepted: 23 August 2023 / Published online: 13 September 2023

Abstract
The current study examined the effect of the linguistic status of the verbal previewing strategy on the outcomes of reading comprehension tasks among second ($N=25$, age $7.08 \pm .3$), and sixth-grade students ($N=25$, age $11.75 \pm .25$), with typical reading development. The texts for each group were carefully matched and were divided into three conditions of verbal previewing: (a) Standard Arabic previewing (hereafter: StA previewing); (b) spoken Arabic previewing (hereafter: SpA previewing); (c) without previewing. The results showed that for the second-grade readers, SpA previewing had a significant contribution to the reading comprehension outcomes compared to the other conditions of previewing while for the sixth-grade readers; StA previewing had a significant contribution to the outcomes of reading comprehension. The findings were explained according to the assumption that relatively native Arab speaking students develop a progressive change toward activation of StA representations for verbal learning. Such representations become more efficient as a result of the dominant exposure to StA during performing reading and writing tasks.

Keywords Previewing · Reading comprehension · Arabic language · Diglossia · Reading

Introduction

There is no doubt that reading comprehension has been a focus of interest for many researchers and educators since it is considered an important route for acquiring knowledge from written texts (Coiro, 2003; Gersten et al., 2001). Different theories have been proposed for the purpose of understanding the contribution of different variables to the effectiveness of reading comprehension among learners of different ages (for example: Cain

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et al., 2004; Guthrie et al., 1999; Lesgold et al., 1978; McNeil, 2011; Perfetti & Stafura, 2014; Reed et al., 2016).

One of the important theories in the field is the "verbal efficiency theory" (see Perfetti, 1985), which holds that efficiency of reading comprehension is related to the effectiveness of lower order processes that enable efficient access to the semantic level from the written codes. Working memory and automatization of orthographic and phonological processes were counted among such lower order processes (Beck et al., 1982; Lesgold et al., 1978). The more effective the lower processes are, the greater the chances of reaching the conceptual level and understanding written content.

Due to the importance of the efficiency of lexical activation in reading comprehension, the hypothesis of lexical quality was further proposed, which underlies the importance of access to semantic knowledge after the processes of orthographic and phonological activation (Perfetti, 2007; Perfetti et al., 2002). The quality of such lexical access determines, among other things, the effectiveness of reading comprehension.

Another approach that places the contribution of the efficiency of lower order reading processes alongside the linguistic efficiency was the "simple view of reading" approach (Gough & Tunmer, 1986). According to this approach, the more automated the reading process, the closer the efficiency of reading comprehension is to that of listening comprehension. That is, the transformation of a written text into a level of verbal information is dependent on the degree of automatic reading. As written word recognition becomes more automatic, more cognitive resources are available for understanding the verbal content (Hoover & Gough, 1990).

It is important to note that the above-mentioned approaches conclude that automaticity in reading words increases the chances of understanding the written content. It has been established that automaticity in word recognition increases the chance of semantic activation in a way that directs sufficient mental resources to meta-cognitive processes (high order processes) for understanding the written content (Johnston & Kirby, 2006; Verhoeven & Perfetti, 2011). Accordingly, the different approaches converge on the fact that fluent access to the semantic level of knowledge might affect the quality of the reading comprehension. Therefore, ineffectiveness of lexical representations can disrupt or delay the processes of reading comprehension (Perfetti & Hart, 2002a). Support for this assumption came from investigating the outcomes of reading comprehension while the readers were asked to deal with written texts in a foreign language compared their own first language (for example, Farran et al., 2012; Li & Clariana, 2019). The quality of automatization in reaching the lexical representation during reading in the first language is more effective than in the foreign language. Reading in a foreign language might be a challenging process due to the low degree of automatization in both lower and higher order processes (Geva & Yaghoub Zadeh, 2006).

It is important to note that in some diglossic languages, such as Arabic, when reading skills are acquired in the higher and standardized literary form of Arabic language (hereafter: StA)- which is different from the child's daily spoken Arabic language (hereafter: SpA), the lexical-semantic representations of words in StA are not as effective as those of the child's SpA (Abu-Liel et al., 2022; Saiegh-Haddad, 2018).

Various researchers have even thought that reading comprehension in StA is a challenge for native readers in the Arabic language and can resemble reading a foreign language (Eviatar & Ibrahim, 2000; Ibrahim, 2006, 2009). For example, Ibrahim and Aharon-Peretz (2005) manipulated semantic priming for native Arab high school students by using SpA priming words while the target words were either in StA language or Hebrew (as a second language for the participants). The results of the study did not reveal any difference

between Hebrew and StA targets when the prime words were in SpA. Accordingly, Ibrahim and Aharon-Peretz postulated that in spite of the intensive daily use that adult native Arabic speakers make of SpA and StA, and despite their shared origin, the two languages retain their status as first and second languages in the cognitive system. Recent neurocognitive findings supported the brain-based language dominance in the diglossia situation in Arabic suggesting a separation between the brain language systems for StA and SpA (Khateb & Ibrahim, 2022). However, Khateb and Ibrahim (2022) proposed that this separation is modality dependent, one in the auditory modality (SpA) and one in the visual written modality (StA).

However, various researchers postulate that strategies that may help the reader make predictions during reading of written texts might contribute to the effectiveness of the lexical activation and in turn optimize the comprehension of written text (Gurlitt & Renkl, 2010; Murphy et al., 2009; Tarchi, 2015). One of the major pedagogical strategies proposed for improving reading comprehension is the "oral previewing" of information that appear in the text (Pressley & Gaskins, 2006; Vaughn & Kettman Klingner, 1999; Zhaohua, 2004). Using previewing techniques allows readers to recall prior knowledge and helps them set a purpose for reading. Previewing calls for readers to skim a text before reading, looking for various features and information that will help them to comprehend the text as they return to read it in detail later (Fisher, 2016). The basic argument behind the use of oral previewing strategies is that it can contribute to a process of anticipating information, events and story lines that may appear in the text, which therefore streamlines students' prediction processes and improves their efficiency in directing attentional resources to more relevant information. In addition, previewing techniques can improve the prediction of meaning of unknown concepts and contribute to the overall effectiveness of information recall processes (Chen & Graves, 1995).

The contribution of the previewing strategies in reading comprehension was found to be particularly effective in improving reading comprehension for texts presented in a second language (see Zhaohua, 2004). Enabling reading comprehension in a second language enables optimization of predictive processes in the text and control of comprehension processes. Accordingly, since the case of the Arabic language may constitute a situation of bilingualism in the same linguistic context (Eviatar & Ibrahim, 2000; Ibrahim, 2006, 2009), it is interesting to examine the contribution of the previewing process to reading comprehension in Arabic. However, it is important to note that formal exposure to StA usually begins in first grade during the process of reading and writing acquisition (Taha, 2017). Before the first grade, the dominant language used in teaching is SpA. Accordingly, the present study sought to examine whether there is a progressive change in the contribution of the linguistic route of previewing language as a result of the change of the dominant language of teaching and learning in formal schooling years (StA versus SpA). Progressive change in the contribution of the linguistic route of previewing in reading comprehension refers to the change in the lexical representations and conceptualizations from one linguistic domain to another as a result of the continuous exposure to such linguistic domain for performing reading and writing related tasks (Khateb & Ibrahim, 2022).

The assumption regarding the progressive change in the preferred modality of previewing is related to the fact that in early classes the dominant language for teaching in Arabic is SpA, while through the middle years of the elementary school a gradual transition begins towards the use of StA in instruction. Accordingly, it would be assumed that for beginning readers, SpA previewing language would contribute to the reading comprehension outcomes more than previewing in StA, while the opposite direction of contribution would be expected for older readers. For this aim, the present study examines the effect of

the linguistic status of verbal previewing on the outcomes of reading comprehension tasks among second and sixth-grade students with typical reading development. It is important to mention that investigating the role of the linguistic distance between spoken and written varieties on the performances in reading skills is on the focus of the research in different languages rather than Arabic. For example, despite common linguistic origins between Urdu and Hindi, the two languages have different orthographic and linguistic features. Hindi and Urdu also share the same grammar and most of the basic vocabulary of everyday speech; but they have developed as two separate languages in terms of script, higher vocabulary, and cultural ambiance. Different researchers were interested in exploring the role of the unique orthographic features of each language on the process of word recognition and language education among bilingual Urdu-Hindi speakers (see for example: Auleear Owodally, 2014; Rao et al., 2011).

Diglossia in Arabic

SpA has different vernaculars that vary from one geographic area to another. The differences between these vernaculars are found at all the different aspects of structure and their interfaces: phonology, morphology, syntax, and semantics (Taha, 2013). In any case, all variations of different SpA vernaculars are different from StA, which is considered the universal and standardized literary language for all Arabic speakers. The grammatical system of StA and the different variates of SpA show significant differences. Usually, the first time that native Arab-speaking children are exposed to written StA is when they begin to read and write (Taha, 2013). It is important to note that Arab children are usually exposed to StA before their formal learning in school. For example, when they exposed to computer games, phones games applications, cartoon television shows, etc. However, this exposure could not be considered as formal and intensive as when they begin to learn in schools, and mainly when they start to learn reading and writing skills. During this period of development, SpA is considered as the main tool of verbal communication and learning. Within this situation, and specifically at the point in time of learning about the Arabic alphabetic system and letter-sound correspondences, children find themselves exposed to a linguistic system that is relatively different from the linguistic system they have acquired and used at home. The linguistic distance between StA and SpA varieties of Arabic is a classic example of Diglossia (Ayari, 1996; Ferguson, 1959).

Diglossia in Arabic was and already found to affect the acquisition of phonological awareness, reading and writing among Arabic-speaking children (Taha, 2013; Mannai & Everatt, 2007). Recent research findings indicated the effect of diglossia in Arabic during performing syntactic and grammar-based tasks, this effect was evident by using behavioral and electrophysiological measures (Idrissi et al., 2021; Khamis-Dakwar & Froud, 2012).

In addition, the linguistic distance between SpA and StA leads to the existence of different types of lexical status of words: pure SpA words, pure StA, similar but not identical words, and identical words. This distance depends on the degree of the overlap between the phonological structures of the word (pronunciation of the word) in SpA with the one in StA. Hence, pure SpA and StA words are those that refer to the same conceptual meaning but have completely different pronunciation and phonological structure within each linguistic branch of Arabic. For Example, the conceptual semantic term "hat" is being referred to by the phonological pronunciation "tˁaaqiyya" as the SpA word that refers to the semantic concept "hat", while the word "qubbaʕa" is the suitable word in the StA context. In addition, other words from SpA and StA share most of the phonological structure but each of

them fit the syllabic structure of the linguistic context where each word belongs to, therefore these words are not identical. For example, the conceptual semantic term "Screen" is referred to by the word "šaašeh" in SpA, while the word "šaašah" is used within the StA context. The other groups of words are the identical words. For example, the concept "pen" is referred to by the word "qalam" both within the northern Palestinian SpA vernacular and within StA as well. It is important to mention that the overlap between the SpA and the StA is different among the different vernaculars of the SpA, accordingly, this overlap might be different across the different SpA vernaculars.

As it was mentioned before, given that SpA is acquired before StA and processed in a more automated manner than the latter, researchers have proposed that StA behaves as a second language among native Arab speakers (Ibrahim & Aharon-Peretz, 2005). More specifically, formal exposure to StA usually begins in first grade during the process of reading and writing acquisition. For example, in the case of native Arab children in Israel, until first grade, the dominant route of language for learning purposes is SpA. In addition, and in view of the difficulty in dealing with written texts in StA in the initial stages of reading acquisition, the Ministry of Education in Israel recommends relying on texts that combine words with the same phonological structure in SpA and StA alongside the use of SpA as a central teaching tool for mediation and instruction (The Ministry of Education in Israel, 2009).

Accordingly, the present study sought to examine whether there is a progressive change in the activation of the linguistic route of learning as a result of the change of the dominant language of teaching and learning through formal schooling years (StA versus SpA). For this aim, the present study examines the effect of the linguistic status of previewing on the outcomes of reading comprehension tasks among second and sixth-grade students with typical reading development.

Method

Participants

The study tested fifty students from second and sixth grade with typical reading development: Twenty-five students, (13 boys and 12 girls), from second grade (age 7.08 ± 0.3), and twenty-five students, (15 boys and 10 girls), from sixth grade (age 11.75 ± 0.25). The participants were speakers of the northern Palestinian vernacular of Arabic and were sampled from different elementary schools. All the participants had the same opportunities of exposure to StA before starting their school years. The researchers were given access to the schools after obtaining approval from school administration and parents' consent. In addition, Informed consent was obtained from all individual participants included in the study.

The screening procedure was based on a random selection of students with intact reading skills according to their reading fluency scores as reported by their schools. Students who fell between the 50th to the 75th percentile according to their schools reading fluency scores were selected as having typical reading skills. It is important to note that for each student, there is a school score that reflects his/her performance in reading fluency as it was measured according to the school's fluency tests. Since the data collection was conducted in the second semester of the school year, the first semester reading fluency scores were used. In addition, the existence of uniform objective indicator for examining reading fluency for all students in the schools, and in the absence of standardized fluency

tests, the above-mentioned method could be considered as a valid alternative for participant selection. Accordingly, in the first step in the current study, typical readers were those with reading fluency scores that ranged between the 50 to the 75 percentiles. All the developmental and behavioral background profiles were collected by using a parent's developmental reporting questionnaire that was developed for the purposes of the current study. The developmental and behavioral backgrounds profile were gathered for each participant after receiving his/her parents' consent. Based on the the gathered developmental and behavioral background, the second step in the selection process was to exclude participants with neurological, attentional, sensory, or emotional difficulties as this was reported in the parents' questionnaire. All participants came from low-mid socioeconomic backgrounds according to the standard socioeconomic measures in Israel (Israel Central Bureau of Statistics, 2022).

Testing and Materials

The reading comprehension tasks were composed from scientific texts and were adapted for second and sixth grades. In each age group, three texts were used and were matched in their typological levels (length and words number): the first text was used for the previewing condition in the StA, the second text was used after SpA previewing condition while the third text was presented to the participants without any previewing (see appendixes).

The selection of the texts was made according to the appropriate length of the text and the average number of words and level of difficulty for each age group (Table 1 presents the number of words of the texts in each condition of previewing for each grade). The selection of texts was made after a judging process in which six suggested texts were selected by the researchers for each grade. Three teachers of Arabic language were chosen to serve as judges for rating the compatibility of the texts for each grade level by using a a scoring scale ranging from 1 to 5 (1 = "the text is not appropriate at all"; 5 = "very appropriate text"). For each text, the judges rating average was computed. Form the pool of the suggested texts, three texts with the highest average rating score of compatibility were selected for each group.

Composing the questions was made by the researchers. For each text twenty multiple-choice questions were composed. From this pool of questions, ten questions were selected after the judgment process, ten questions were selected from the initial pool of questions for each text. The judges were asked to select the same type of questions for each text to insure a full matching between the texts' levels and question types of the texts in each grade level. The questions for each text examined four levels of understanding as follows: (a) understanding the overt meaning in the text (b) searching for specific information (c) inferencing and understanding the implicit meaning in the text and application (d) examining the understanding of new terms. Each correct answer earned the subject ten points.

Table 1 Words account for each text

	StA previewing	SpA previewing	No-previewing
Second grade	137	134	134
Sixth grade	414	404	408

StA Standard Arabic, *SpA* Spoken Arabic

Procedure

The subjects were examined individually in a quiet room inside the school. Each participant was tested in three sessions, one session for each previewing condition. Each session was 45 min to allow participants to complete the reading comprehension task including the previewing phase which was about 10 min for each text. Presenting of the previewing and the control conditions was randomly done. Accordingly, the time that was devoted for performing the non-previewing condition was thirty-five minutes only.

The previewing processes, which were performed in both linguistic conditions (SpA and StA), were matched in terms of the previewing focus and content. In each previewing process, both StA and SpA were done in an adapted manner in terms of previewing steps. In the first step, the examiner generally presented the title of the text and explained its meaning. In the second step, the examiner orally asked the participant about his/her background knowledge related to the title of the text, and each participant was asked to tell the examiner all the information which s/he knows and are related to the topic of the text. It is important to note that in the SpA condition, the participant was asked to retrieve his/her background knowledge using SpA, while in the StA condition of pre-viewing, the participant was asked to use StA only for the retrieval process. In the third step, the examiner presented five main points that the text is intended to discuss. After completing the previewing process, the participant was asked to read the text and to answer the questions. Each participant was asked to complete the task within 35 min. It is important to note that all subjects completed the task before the 35-min were up.

Results

The repeated measures analysis of variance was used to examine the effect of the type of the pre-viewing condition (StA, SpA and no-previewing) between and within the two grades. The results of the analysis showed a significant effect of the type of previewing $F(2, 47) = 12.5$, $p < 0.001$, without a significant effect of grade $F(1, 48) = 2.85$, $p = 0.09$. A significant interaction was found between the previewing type and grade $F(2, 47) = 46.98$, $p < 0.001$. Table 2 presents the averages and standard deviations of performance in reading comprehension in each grade by type of pre-viewing.

Another analysis of variance was conducted to investigate the differences between the previewing conditions in each grade.

For the second grade, the analysis of variance showed that there was a significant effect of the type of pre-viewing $F(2, 23) = 54.49$, $p < 0.001$. A further analysis of Bonferroni's post-hoc test indicated that there was a significant difference in reading comprehension performance after the StA previewing (M = 68) and the performance measured after SpA previewing (M = 89.2), as well as between the performance after SpA previewing and the condition of

Table 2 Means and ± SDs for the reading comprehension performances in the different conditions of previewing

	StA previewing	SpA previewing	No-previewing
Second grade	68 ± 16.07	89.2 ± 12.55	76.8 ± 16.25
Sixth grade	90.8 ± 10.37	80.8 ± 14.41	80.4 ± 14.57

StA Standard Arabic, *SpA* Spoken Arabic

no-previewing (M = 76.8). A significant difference between the performance in reading comprehension after StA condition of previewing and the no-previewing condition.

For the sixth grade, the analysis of variance showed that there was a significant effect of the type of previewing, F (2, 23) = 9.27, $p = 0.001$. A further analysis of Bonferroni's post-hoc test indicated that there was a significant difference in reading comprehension performance measured after the StA previewing (M = 90.8) and reading comprehension performance measured after SpA previewing (M = 80.8), and also between the StA previewing condition and the no-previewing condition (M = 80.4). However, no significant difference was found between SpA and the no- previewing conditions.

Discussion

The findings of the present study showed that the contribution of the linguistic status of the previewing process (StA versus SpA) to reading comprehension in Arabic varies for beginning readers compared to skilled readers. Generally, the contribution of the previewing during reading comprehension can be reflected in the efficiency of the prediction and memorizing of information during reading (Pressley & Gaskins, 2006; Vaughn & Kettman Klingner, 1999; Zhaohua, 2004). The previewing, as was given in the present study, was mainly based on the use of verbal presentation of relevant information related to the content of the text. For beginner readers, a significant contribution of reading comprehension outcomes was observed in SpA previewing condition, whereas for older subjects StA verbal previewing yielded better results compared to the other conditions. It is important to note again that each group was tested with age-appropriate tasks, since the cognitive abilities of the two experimental groups are not the same by virtue of their age.

For young readers, the teaching process of reading and writing skills in schools relies mainly on the mediation of SpA, most often the teaching process in the early years of school is performed by using SpA as the main language of instruction (Khateb & Ibrahim, 2022). As it was mentioned before, in view of the difficulty in dealing with written texts in StA in the initial stages of reading acquisition, the Ministry of Education in Israel recommends relying on texts that combine words with the same phonological structure in SpA and StA alongside the use of SpA as a central teaching tool for mediation and instruction (The Ministry of Education in Israel, 2009).

Using SpA for instructional purposes for beginner learners is related to the fact that those learners are not yet considered as proficient in the different domains of StA language, i.e., the semantic, the morphological, the phonological and the syntactical domains (Eviatar & Ibrahim, 2000; Ibrahim, et al., 2007). Therefore, it seems that among beginner readers, the dominant activation of the linguistic representations, which enable the efficient processing of written verbal information, is SpA. Accordingly, this group of readers performed better when previewing was in SpA means that they relied on the little information they got from the oral previewing in the StA compared to the one they got from SpA previewing.

Over-time, the development of automatization in reading alongside the expansion of vocabulary in StA, learners will begin to be exposed to and read more written instructions in StA. Therefore, the increase in exposure to learning and instruction is transferred to StA and reveals into establishing more efficient verbal representations and conceptualizations in such linguistic domain (Khateb & Ibrahim, 2022). Accordingly, remembering, and internalizing information, as it is presented in StA, begins to develop. In this stage, the StA

itself can activate the lexical conceptualization processes without the need for the mediation by SpA (Taha, 2017). Cognitively, the status of StA for beginner readers is similar to the status of a second language (Ibrahim & Aharon-Peretz, 2005), which does not cause these direct conceptual activations. Accordingly, for such beginner readers, StA information needs to be mediated by SpA, therefore, presenting information by using StA may or may not contribute to the internalization process. With the increased exposure to learning processes in StA, its status becomes dominant in terms of activating the conceptual structures that are related to internalizing information presented in StA. Hence, direct activation of the conceptual structures will take place without the mediation of SpA. This situation explains why the older readers were significantly contributed from early previewing of information in StA condition compared to SpA one.

It is important to notice that for all ages the reading processes take place in StA. This fact contributes to strengthening the lexical status of StA as a function of reading age and accordingly contributes to its activation in the level of lexical access when reading texts. Therefore, based on the findings of this study, it can be argued that the efficient activation of StA in processes related to written language comprehension is a progressive matter that is a result of the dominance of such language over years of exposure to written texts and reading and writing assignments.

While looking at the averages of the performances in reading comprehension tasks in accordance with the different previewing conditions in each grade, an interesting picture arises. For beginner readers, the outcomes of the reading comprehension after StA previewing were the lowest. To explain this interesting finding, it can be assumed that for beginner readers, StA presents a challenging linguistic context for learning. The non-automated processing of such linguistic previewing resulted in cognitive overload at this early reading level which led to the depletion of the participants' cognitive resources (Geva & Yaghoub Zadeh, 2006; Johnston & Kirby, 2006; Verhoeven & Perfetti, 2011). Accordingly, the depletion of the cognitive resources at that stage of previewing has resulted in a decrease in the efficiency of reading comprehension. However, for older readers, there was no difference in the contribution of SpA condition of previewing compared to the no-previewing condition. Apparently, among typical skilled readers in Arabic, the previewing will have a significant effect when it activates the lexical structures corresponding to the language used to present the information in the written text.

Considering the "verbal efficiency theory" (see Perfetti, 1985) and the "simple view of reading" approaches (Gough & Tunmer, 1986), both may agree that reading fluency beside verbal efficiency may contribute to more effective activations of the linguistic representations when extracting information from written text. Accordingly, the readers' ability to represent preliminary information about the written text may facilitate the prediction of the written information in the text when converting it into linguistic structures. Among skilled readers, StA previewing will contribute to a more effective mental activations of the relevant linguistic structures that will allow the effective prediction verbal from the written texts since the automatic mediation of the conversion of written structures into verbal structures passes through StA. Such direct activation saves cognitive resources that optimize the contribution of StA previewing in the case of fluent reading. This is not the same situation among novice readers. For young and novice readers, there is still non-automatic mastery of linguistic structures in StA. Although the written texts are written in StA, but the direct activation from the text to StA language representations is not at the same level of automatization as in the case of the skilled readers. Hence, SpA previewing is the one that will contribute better to more efficient prediction of the information in the written text at this stage of reading acquisition.

However, while the current study findings provided an answer regarding the contribution of the linguistic status of previewing among readers with typical reading development; it is still unclear what is the contribution of the previewing linguistic context in Arabic to the reading comprehension performances among poor readers. It can be assumed that poor readers are those who experienced poor exposure to print and StA (Cunningham & Stanovich, 1990). Hence, it can be assumed that the lexical status of StA among those readers will be similar to its status among novice or beginner readers, therefore, it can be assumed that readers with reading difficulties will exhibit similar performance to the findings which were observed among the beginner readers. Further research is needed for examining this assumption.

In sum, the findings of the present study shed light on the developmental status of the lexical representations of StA among Arabic-speaking readers. The mastery of StA is progressive and leads into progressive change in the contribution of the linguistic status of the verbal previewing.

Appendix

Second Grade Text 1 (StA Previewing)

اَلنَّباتاتُ الْمُفْتَرِسَة

اَلنَّباتاتُ الْمُفْتَرِسَةُ هِيَ نَباتاتٌ تَصْطادُ الْحَشَراتِ، مِثْلَ النَّمْلِ وَالْجَنادِبِ وَالصَّراصيرِ، وَتَأْكُلُها. يوجَدُ بِداخِلِ النَّباتاتِ الْمُفْتَرِسَةِ رَحيقٌ طَعْمُهُ حُلْوٌ وَرائِحَتُهُ زَكِيَّة. لِذٰلِكَ، تُحِبُّ الْحَشَراتُ هذه النَّباتاتِ وَتَأْتي إِلَيْها دونَ أَنْ تَتَنَبَّهَ لِلْخَطَر. عادَةً تَعيشُ النَّباتاتُ الْمُفْتَرِسَةُ في الْمُسْتَنْقَعاتِ وَفي الأَماكِنِ الَّتي تَكْثُرُ فيها الأَمْطار.

يوجَدُ أَنْواعٌ كَثيرَةٌ مِنَ النَّباتاتِ الْمُفْتَرِسَةِ، مِثْلُ: خَنّاقِ الذُّبابِ وَالنَّدِيَّةِ وَنَباتِ الأَباريق. أَوْراقُ خَنّاقِ الذُّبابِ لَوْنُها أَحْمَرُ لامِعٌ، وَيوجَدُ عَلَيْها رَحيقٌ حُلْو. كُلُّ وَرَقَةٍ مَقْسومَةٌ إِلى نِصْفَيْنِ وَتُحيطُها أَشْواكٌ طَويلَة. عِنْدَما تَأْتي الْحَشَرَةُ لِكَيْ تَمْتَصَّ الرَّحيقَ، تَقِفُ عَلى الْوَرَقَةِ فَتَنْطَبِقُ الْوَرَقَةُ عَلى الْحَشَرَةِ مِثْلَ الْكِتاب. تَمْنَعُ الأَشْواكُ الْحَشَرَةَ مِنَ الْهَرَبِ فَتَعْلَقُ هُناك. بَعْدَها، يُفْرِزُ خَنّاقُ الذُّبابِ مِنْ داخِلِهِ سائِلاً عَلَيها فَتَغْرَقُ الْحَشَرَةُ وَتَذوب. في النِّهايَةِ، يَمْتَصُّ خَنّاقُ الذُّبابِ الْحَشَرَةَ الذّائِبَةَ وَيَتَغَذّى عَلَيْها بِبُطْء.

إِذا وَقَعَ عَلى الْوَرَقَةِ شَيْءٌ لا يَأْكُلُهُ نَباتُ خَنّاقِ الذُّبابِ، مَثَلَ: غُصْنٍ صَغيرٍ، فَإِنَّ الْوَرَقَةَ تَنْطَبِقُ، ولكنها تَعودُ وَتَنْفَتِحُ حالًا وَبِسُرْعَة.

Second Grade Text 2 (SpA Previewing)

اَلْغوّاصَة

اَلْغَوّاصَةُ هِيَ وَسيلَةُ نَقْلٍ بَحْرِيَّةٍ، مِثْلُ السَّفينَةِ، الْغَوّاصَةُ تَسْتَطيعُ أَنْ تَغوصَ وَتَسيرَ تَحْتَ سَطْحِ الْماء. يوجَدُ في الْغَوّاصَةِ مِنْظارٌ يُسَمّى "عَيْنُ الْغَوّاصَة". يَرْفَعُ قُبْطانُ الْغَوّاصَةِ الْمِنْظارَ لِكَيْ يَرى ما يَحْدُثُ فَوْقَ سَطْحِ الْماء.

تُبْحِرُ الْغَوّاصَةُ مَسافاتٍ طَويلَةً دونَ أَنْ يَراها أَحَدٌ، لِذٰلِكَ يَسْتَعْمِلُها الإِنْسانُ في الْحُروب. ويَسْتَعْمِلُ الإِنْسانُ الْغَوّاصَةَ لِلسِّياحَةِ، يوجَدُ في الْغَوّاصَةِ السِّياحِيَّةِ شَبابيكُ ثابِتَةٌ لا تَنْفَتِحُ، حيثُ يَسْتَمْتِعُ السّائِحُ في أَعْماقِ الْبَحْرِ، لِأَنَّهُ يُشاهِدُ النَّباتاتِ الْغَريبَةَ وَالأَسْماكَ الْعَجيبَة.

تُوجَدُ غَوّاصاتٌ صَغيرَةٌ وكَبيرَة. الْغَوّاصَةُ الْكَبيرَةُ تَتَّسِعُ لِكَثيرٍ مِنَ الْمُسافِرينَ، وتَسْتَطيعُ أَنْ تَبْقى تَحْتَ الْماءِ لِعِدَّةِ أَيّامٍ. أَمّا الْغَوّاصَةُ الصَّغيرَةُ فَتَتَّسِعُ لِقَليلٍ مِنَ الْمُسافِرينَ، وتَبْقى تَحْتَ الْماءِ لِعِدَّةِ ساعات، وهيَ سَريعَةٌ وَتَتَحَرَّكُ بِسُهولَةٍ في الأَماكِنِ الضَّيِّقَة.

يوجَدُ نَوْعٌ جَديدٌ مِنَ الْغَوّاصاتِ الصَّغيرَةِ، تُسَمّى اَلْغَوّاصاتِ الْآلِيَّة، لا تَحْتاجُ إلى قُبْطانٍ لِقِيادَتِها. يَسْتَعْمِلُ الْإِنْسانُ هٰذِهِ الْغَوّاصَةَ عِنْدَما يُريدُ أَنْ يُصَوِّرَ فِي مَناطِقَ خَطِرَةٍ عَلى الْإِنْسان.

Second Grade Text 3 (Without Previewing)

الباندا

أَلْباندا حَيَوانٌ هادِئٌ وَجَميلٌ يَعيشُ في غاباتِ الصّين. جِسْمُ الباندا أَبْيَضُ وَأَسْوَدُ. رَأْسُهُ أَبْيَضُ، وَحَوْلَ الْعَيْنَيْنِ أَسْوَدُ، لِذٰلِكَ يَظْهَرُ كَأَنَّهُ يَضَعُ نَظّاراتٍ عَلى عَيْنَيْهِ. يَتَغَذّى الباندا بِشَكْلٍ رَئيسيٍّ عَلى نَباتِ الْخَيْزَران. كَما أَنَّهُ يَتَغَذّى قَليلاً عَلى الْأَسْماكِ، وَالْحَشَراتِ، وَكَذٰلِكَ عَلى الْقَوارِضِ الصَّغيرَةِ مِثْلِ الْفِئْرانِ وَالْجُرْذان.

عِنْدَما يُولَدُ الباندا الصَّغيرُ يَكونُ زَهْرِيَّ اللَّوْنِ، وَأَعْمى، وَبِلا فَرْوَةٍ، وَيَظَلُّ مُتَعَلِّقًا بِأُمِّهِ لِمُدَّةِ سَنَةٍ وَنِصْف. تَهْتَمُّ الباندا الأُمُّ بِالْمَوْلودِ الصَّغيرِ، تُرْضِعُهُ مِنْ حَليبِها وَتَحْتَضِنُهُ وَتَلْعَبُ مَعَهُ كُلَّ الْوَقْتِ. أَمّا الباندا الأَبُ فَهُوَ كَسولٌ وَلا يُشارِكُ في تَرْبِيَةِ ابْنِهِ.

في الْماضي كانَ الإِنْسانُ يَصْطادُ الباندا بِكَثْرَةٍ بِسَبَبِ فَرْوَتِهِ الدّافِئَةِ وَالْجَميلَة. أَمّا الْيَوْمَ فَالإِنْسانُ يُدَلِّلُ الباندا وَيَحْمِيهِ وَيُحاوِلُ أَنْ يُنْقِذَهُ مِنْ خَطَرِ الانْقِراض.

تَتَمَنّى حَدائِقُ الْحَيَوانِ أَنْ تُرَبّيَ الباندا لأَنَّهُ حَيَوانٌ نادِرٌ، أَيْ عَدَدُهُ قَليلٌ جِدًّا في الْعالَمِ، وَلأَنَّهُ حَيَوانٌ مَحْبوبٌ جِدًّا عِنْدَ النّاسِ، وَأَيْضًا لِكَيْ تَحْمِيَهُ مِنْ خَطَرِ الانْقِراض.

Sixth Grade Text 1 (StA Previewing)

الأخطبوط

الأخُطبوط حَيوان مائِيّ مِن فَصيلَة الرُخوَيّات؛ وَهِيَ فَصيلَة الحَيوانات التي لَيسَ لَها هَيكَل عَظمِيّ. يَتَكَوّن جِسمِ الأخطُبوط مِن رَأسٍ صَلبٍ وَثَماني أَذرُعٍ رَخوَة. يحْتَوي رَأس الأخطُبوط عَلى جَميع أعضاء جِسمِهِ الدّاخِلِيّة، بِما فيها ثَلاثَة قُلوب، أَمّا دَمِهِ فَأَزرَقَ فاتِح. أذرُعَهِ الثَّماني مَسؤولة عَن الإحساس وَالشَمّ وَالذَوق، وَيستَخدِمَها الأخُطبوط للقِيامِ بالعَديدِ مِنَ الأمورِ المُهِمّةِ في حَياتِهِ، كَالتَّغذِيَةِ وَالحَرَكَةِ وَالدِفاعِ عَنِ النَفسِ.

أنواعِ الأخطُبوط

يوجَد حَوالي 250 نَوعًا مُختلفًا مِن حَيوانات الأخطُبوطِ، تَعيشُ كُلّها في المُحيطات. تَصِل هذِهِ الحَيوانات إلى أَحْجام كَبيرَة، وَأَكْبَرُها حَجمًا هُوَ أَخْطبوط المُحيطِ الهادِئ الذي قَد يَصِل طولَهُ إلى سِتَّة أمتارٍ. مِن ناحِية أُخرى، نَجِد أنواعًا صَغيرة جِدًّا مِن الأخطبوط، فَمثلًا: حَجم أخطُبوط كاليفورنيا القزَميّ لا يَتَجاوَز حَجم عِملَة مَعدَنِيّة صَغيرَة. أمّا الأخطُبوط ذو الحَلَقات الزّرقاءِ فَيعيشُ في المِياه الضّحلَة، وَلا يَتَعَدّى حَجمَهُ كَفّ طِفل صَغير؛ ولكِن بِالرُغمِ مِن صِغَر حَجمِهِ وَألوانِهِ البَرّاقَة، يُعتَبَر هذا الأخطَبوط أشَدّ خُطورة مِن أيّ نَوعٍ آخرٍ مِنَ الأخاطيب، لأنّ عضّته تُؤدّي إلى المَوت.

قُوّة خارِقَة

يتَمَتّع الأخطُبوط بِقُدرةٍ عالِية عَلى الفَتْكِ بِالكائِنات البَحريّة الأخرى، وَيَستطيع أن يُدخِل أذرُعِه الرّخوة في الشّقوقِ والجُحورِ الضّيّقة أثناء بَحثِه عَن طَعامِه مِن السّمَك وَالسّرَطانات وَالمَحار. يُعطّي كُلّ ذِراع مِن أذرُع الأخطُبوط عَدد كَبير مِن المِمَصّات. تَلتَصِق المِمَصّات بِالفَريسَة وَتَمسُكها بِقوّة، ثُمّ يَبدأ الأخطُبوط بَعدَ ذٰلِك بِتَقطيع الفَريسة إلى شَرائِح، وَالتِهامِها بِواسِطَة فَكَيْهِ القَوِيَّيْن.

الدّفاع عَن النّفس

لِلأخطُبوط قُدرةٍ عَلى الاختِباء وَالتّخفّي؛ فَجِسمَهُ الرّخو يَجعَلَهُ قادِرًا عَلى حَشْر نَفسِهِ في الأماكِن الضيّقَة، فَإذا اتّسَعَ المَكان لِإدخالِ رَأسِهِ الصّلبِ، فَسَيَتَمَكّن الأخطُبوط حَتْمًا مِن إدخالِ بَقيّة جِسمَهُ أيْضًا. يَستَطيعُ الأخطُبوطِ كذلِك أنْ يُغَيّر لَونَهُ، فَيُمكنُهُ أن يَتَشَبّه بالصّخورِ، أو بِالشُعَبِ المُرجانِيّة، أو بِلَون قاع المُحيط الرّمليّ، كَي يَتَوارى عَن أنظار الحَيوانات المُفتَرِسَة. وإذا شَعَرَ الأخطبوط بِخَطَر الافتِراس، فَإنّهُ يَفرِزُ حِبرًا داكِن اللّون يَظهَرُ كَسحابَةٍ كَبيرةٍ يُعجِز هذا الحِبر الحيَوان المُفتَرِس عَن رُؤية الأخطبوط، وَيُفقدَهُ قُدرَتهِ عَلى الشَّمّ أيضًا، وهكَذا يَتَمَكّن الأخطُبوط مِن الهَرَب.

تضحِية أَمّ

تَضَع أنثى الأخطُبوط عَشَرات الآلاف مِن البَيض، لا يَتعدّى حَجم البَيضة الواحِدَة مِنها حَجم حَبّة أرزّ. تُخفي الأمّ بَيضَها داخِل وَكْرٍ آمن، يُصعّب دُخول الحَيوانات المُفتَرسَة إليهِ. تَبقى الأمّ في الوَكر في انتظار فقْس البَيض، دونَ راحَة أو طَعام، وَتُنَظّف البَيض مِمّا يَعلق بِهِ مِن بَكتيريا أو طَحالِب، كَما أنّها تَنفُخ المِياه عَلَيهِ، لِتَصِل إليهِ كَمّيّات أكبَر مِن الأكسِجين. وَفي خِلال سِتّة أشهُر يَفقِس البَيض وَتَموت الأمّ. تَعلو صِغار الأخطبوط مِن القاعِ إلى سَطح المُحيط، وَفي الطّريق، تَقَع أعدادٍ كبيرةٍ مِنها فَريسة لِلأسماكِ والطّيور والدلافين.

ينجو عَدَد قَليل مِن صِغار الأخطُبوط خِلال أيّامها الأولى، وعندَها تَختَبئ الصّغار بَينَ الأعشابِ البَحريّة، وَهُناكَ تَبدأ في البَحثِ عَن طَعامَها البَسيط إلى أن تَكبَر وَيحين وَقت عَودَتِها إلى قاعِ المُحيط مَرّة أُخرى.

Sixth Grade Text 2 (SpA Previewing)

البراكين

إذا زُرنا جَنوبَ إيطاليا، وَتَحديدًا البُقعَة القَريبَة مِن بُركان "فيزوف" الشّهير، وَجَدناها تَغُصُّ بِالكَثير مِن حَدائِق الفاكِهَة، وَالبَساتين، وَالكُروم التي تَنتَشِر عَلى جَوانِب البُركان الخامِد، وَبِالقُرب مِن قِمَّتِهِ أيضًا. وَيَرجِع ذلك إلى أنّ الأرض، في هذا المَكان، تَتَمَيّز بِالخُصوبَة. أمّا في السَّهل الذي يَقَع أسفَل البُركان، فَيَحتشِد الزائِرون مِن جَميع أنحاءِ العالَم، لِمُشاهَدَة الآثار المُتَبَقّية مِن مَدينة "بومباي"، التي دمّرها انفِجار بُركان "فيزوف" قَبل ألفَيْ عام تقريبًا.

كَيفَ حَدَثَ ذلِك؟

بدَتْ بَعضُ الحَيوانات في مَدينَة "بومباي" مُضطَربة بِصورَة غَير طَبيعيّة؛ فَكان هُناكَ كَلبٌ يَنبَحُ بِشِدّة، وَقامَ حِمار بِقلْب العَربة التي كانَ يَجُرُّها. ثُمّ شَعَرَ مُزارِع عِندَ مُنحَدِر جَبَل فيزوف بِهزَّة تَحتَ قَدَمَيْه، كَما لاحَظَ ارتِفاعًا مُخيفًا في الأَرضِ، فَأسرَعَ كَي يُخبِر أهلَ مَدينتهِ. لَم يُدرِك السُّكان خُطورة الأمرَ في البِداية؛ وَلكِن، عِندَما بَدَأت الصُّخور المُتَساقِطة تُهدّد مَنازِلَهُم، جَمَعَ كَثير مِنهُم الأمْتِعة وَتَرَكوا المَدينة. وَفي اليَوم التّالي، انْدَفَعَت مِن البُركان مَوجة حارِقة مِن الرَماد المُشتَعِل دَمّرَت المَدينة.

فَماهيَ البَراكين؟

البَراكين هِيَ مِنَ الظَّواهِر الطَبيعيّة التي حَظيَت باهتِمام الإنسانِ مُنذُ القِدَم. وَالبُركان عِبارة عَن مَكان تَخرُج مِنهُ، أثناءَ الثَّورة البُركانِيَّة، صُخور مُنصَهِرة ساخِنة تُسمّى "لافا"، وَغازات تَأتي مِن باطن الأرضِ بِاتّجاهِ فَتحَة في قِمّة البُركان. يَتكَوَّن البُركان، في الغالِبِ، مِن ثَلاثَة أجزاءٍ:

1. المَخروط البُركانيّ—وَهُوَ الجُزء الذي يُشبِه المَخروط في جَوانِب البُركان المُنحَدِرَة، وَيَتَكوَّن مِن مَوادّ صَخرِيّة وَ"لافا" مُتَصَلِّبَة.
2. مِدخَنَة—وَهِي قَناة تَمتَدّ مِن جَوف الأرض إلى الفُوَّهة، وَتَندَفِع مِن خِلالِها المَوادّ البُركانِيّة بِاتّجاهِ الفُوَّهَة.

3. فُوَّهة—وَهِيَ عِبارَة عَن تَجْويفٍ مُستَدير الشَّكل تَقريبًا، في قِمّة المَخروط البُركانيّ. تَكون مَساحَة الفُوَّهة عِدَّة آلافٍ مِن الأمتارِ؛ وَتَخرُج مِنها، بَين الحين والآخر، غازاتٌ، وَموادُّ مُنصَهِرة.

البَراكين، كَغَيرِها مِنَ الكَوارِث الطَّبيعيّة، مِثْلَ: الزَّلازِل وَالفَيضانات وَالأعاصير، تُسَبِّب دَمارًا كَبيرًا. وَعَلى الرُّغم مِن هذا الدّمار الذي تُسَبِّبهُ البَراكين؛ فَإنّها تَلعَب دَورًا هامًّا في تَشَكُّل سَطح الكُرَة الأرضِيّة؛ وَفي تَكَوّن الجِبال العالِية. وَإذا خَمَدَت هذهِ البَراكين؛ فَقَد يُؤَدّي ذلِك إلى ظُهور البُحيْرات داخِل فُوَهاتِها. جزءٌ من هَذه البُحيراتِ ذاتُ مياهٍ حارةٍ.

يُساعِد نَشاط البَراكين العُلماء في التَّعرُّف عَلى مَراكِز حُدوث البَراكين في العالَم، وَفي فَهم المَبنى الدَّاخليّ لِجَوفِ الأرضِ، عَن طَريق تَحليل المَوادّ المُختَلِفَة التي يَقذِفُها البُركان.

إنَّ هذهِ البَراكين لا ترحمُ عِندَما تَثور مِن وَقتٍ لآخر، وَبَعضُها قادِر عَلى تَدمير مَناطِق بِأكمَلِها. وَمَع ذلِك؛ فإنّ الإنسان لَم يَبتَعِد عَن السّكَن بِجِوار البَراكين كَي يَحميَ نَفسَه مِن أخطارِها؛ بَل تَجِدَه يَسكُن بِالقُربِ مِنها، وَعَلى مُنحَدَراتِها.

هكذا، فَإلى جانِب مُحاوَلات الإنسان التَّصدّي لِكوارث الطَّبيعة ككوارث مثلُ هذه؛ فَقَد بَدَأَ يُدرِك أن لِهذهِ الكَوارِث وَجهًا آخَر يُمكِنهُ أن يَستَعمِلَهُ لِخيْر البَشريّة وَنَفْعها ما دامَ لا يَستَطيع قَهرها.

Sixth Grade Text 3 (Without Previewing)

الزّئبق

يُعتَبَر الزّئبَق مَعْدَنًا كَالفِضّة وَالحَديد وَالذَهَب وَالنّحاس، وَهُوَ يُشبِه الفِضّة السائِلة في لَونِها. يَختَلِف الزّئبق عَن مُعْظَم المَعادِن بِأنّهُ يَكون سائِلًا في دَرَجَة حَرارَة الغُرفَة، وَيَبقى سائِلًا حَتّى دَرَجَة حَرارَة 38 مُئَوِيّة تَحت الصّفر.

كانَ الزّئبَق مَعروفًا لَدى القُدَماء الصّينيّين وَالهِندوس والإغريق وَالرومان. كَذلِك، عَثَر العُلَماء عَلى مَعلوماتٍ تُشير إلى استِعمالِ الفَراعِنَة (المَصريّين القُدَماء) لِلزئبَق، إذْ وُجِدَتْ آثار لِلزئبَق في رُسوماتِهم في المَعابِد.

وجدَ الزئبقُ بِشكلٍ طَبيعي في قِشرةِ الأرض، وهو يَتحرّرُ في البيئةِ بِفِعلِ الأنشطةِ البركانية وتَعريةَ الصخورِ ونتيجةً للنشاطِ البشري الذي يُمثِّل السبب الرئيسي لإطلاقِ الزئبَقِ إلى البيئة، وخاصَّة من مَحطاتِ توليدِ الطاقةِ العاملةِ بالفَحمِ وحَرقِ الفَحم في المنازِل لأغراضِ التدفئةِ والطَّبخ والأنشِطَة الصِّناعية ومَحارق النّفايات، ونَتيجة لتَعدين الزئبق والذهب والمعادن الأخرى.

يُستَعمَل الزّئبَق في مِقياس الحَرارَة، وَمِقياس الضّغط، وَصِناعَة الدّهان وَصِناعَة بَعض المُطهِّرات. كما يُستعمَل الزّئبَق مَع خَليط مِن مَعادِن أُخرى في أغراض عَديدَة مِثْلَ حَشْو الأسنان وَالبَطاريّات الجافّة. أمّا بُخار الزّئبَق فيُستَعمَل في بَعض أنواعِ المَصابيح الكَهرُبائيّة؛ لِأنّهُ يُشِعّ بِالضّوءِ عِندَ مُرور التّيّار الكَهرُبائيّ خِلالَهُ.

مِثلَما عَرَفَ الإنسان فَوائِدَ الزّئبَق، عُرِف مَخاطِره أيضًا؛ فَهو سامّ جدًّا، ممّا يؤثّر عَلى البيئة. إنّ نُفايات المُنتَجات التي تَحتَوي عَلى الزّئبَق تُلوّث التّربة وَالمِياه عِندَما تُطمَر في الأرض، أو تُلقى في الماءِ، فَيَنتقِل التّلوّث بَعدَ ذَلك إلى النّباتات، ثُمّ إلى الكائِنات الحَيّة التي تَتَغَذّى بِها، حَتّى يَصِل في النّهاية إلى الإنسان.

قَد يَتَعَرّض الإنسان لِلتسمُّم بالزّئبَق، وَذلك عِندَما يَدخُل الزّئبَق إلى جِسمَه عَن طَريق استِنشاق بُخار الزّئبق، أو مُلامَسَتَهُ أو تَناوُل الأطعِمَة التي تَحتوي عَلَيهِ لِفَترَة طَويلَة وَمُتواصِلة، مِثْلَ الأسماك التي تَعيش في بيئَة مائِيّة تَحتَوي عَلى الزّئبق. إذا تَسمَّم الإنسان بِالزّئبَق تَظهَر عَلَيهِ أعراض، مِنها: السُعال، ضَيّق التّنَفُّس، التّقيُّؤ، تقشُّر جِلد اليَدَيْن وَالقَدَمَيْن.

إنّ أخطَر ما في سُمومِ الزّئبَق هُوَ أنّها تَتراكَم بِبُطءٍ داخِلَ الجِسم، دونَ أن يَشعُر الإنسان بِها، حَتّى تَصِل إلى دَرَجَة مُؤذِيَة؛ فَتُتلف أجهزة جِسمَهُ وَخاصّة المُخّ. لِذا، يُحذِّر الأطِبّاءِ مِن تَناوُل المَأكولات التي قَد تَحتَوي عَلى الزّئبَق، وَخاصّة الأسماك. فَفي إحدى القُرى اليابانِيّة، تمّ نَقل 600 شَخص إلى المُستَشفَيات؛ لِأنّهُم أكَلوا أسماكًا تمّ اصطِيادُها مِن مِياه خَليج أُلقِيت فيهِ مُخَلّفات صِناعيّة لِمُنتَجات تَحتوي عَلى الزّئبَق. وَفي بِداية عام 1970، تَخلّصَت بَعض المَناطق في الولايات المتّحدة الأمريكيّة مِن أسماك التونا؛ لأنّ التّحاليل أثبَتَت أنّها تَحتَوي عَلى كَمّيّات ضارّة من مركّبات الزّئبَق.

تُسبِّب بَعض المَصابيح الكَهربائيّة خُطورة إذا تَحطّمَت، وَذلِك لاحتِوائِها عَلى كمّيّات كَبيرة مِن الزّئبَق. فإذا تَحطّم أحد هذهِ المَصابيح في غُرفة ما، يَنبَغي اتّباعُ الخُطواتِ التّالِيّة:

أوّلًا: تَهوية الغُرفة وَمُغادَرَتِها لِمُدّة 15 دَقيقَة.

ثانِيًا: ارتِداء القُفّازات (الكُفوف) المُطاطِيّة.

ثالِثًا: تَنظيف الحُطام بِمِكنسة عادِيّة وَلَيسَ بِمِكنِسة كَهرُبائيّة.

رابِعًا: وَضع الحُطام في أكياس مُحكَمَة الإغلاق.

Declarations

Conflict of interest All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

Ethical Approval Approval was obtained from the ethics committee of Sakhnin College, Israel. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

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