

ʔibn Sīnā's Risālah:  
ʔasbāb huduwθ ʔal-ḥuruwf  
Version I

A Treatise on Phonetics: Translation & Notes<sup>1</sup>

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(P. 53)<sup>2</sup> Praise be to God alone. A praise, that the greatness of His Being, the immensity of His Mercy, and the overflow of His Goodness deserve. His blessings be on His prophet Muhammad and his family.

And now: Not every one who accepts a gift is in need of it, nor every seeker after a treasure, (p.54) is bereft of it. Rather it could be that the rich chooses, in his action, to honor the poor, and the great intends to accept the simple gift from the small. The grand and the generous sheik, the teacher ʔabu Mans<sup>u</sup>wr Muḥammad ʔibn ʔali ʔibn ʔumar ʔal-dzabbān, may God extend his generosity, he is whom you wish him to be, who has in himself the brilliant qualities, and to me, and in my trust many obvious favors. When he requested from me, the request of a benefactor not of an indigent, that I write down, in his name, what I have culled, after extensive research, of the ʔasbāb 'causes' of the huduwθ 'occurrence' of ḥuruwf 'letters' and their variance in heard form in a very brief treatise, I responded to his request obediently. I asked that the Exalted God, will favor me to hold to what is right and to follow what is true. He is the Lord of Mercy.

I have divided the book into six sections, and they are: (P.55)

- On the *sabab* 'cause' of the *huduwθ* 'occurrence' of *s<sup>f</sup>awt* 'sound',
- On the *sabab* 'cause' of the *huduwθ* 'occurrence' of *ḥuruwf* 'Letters',
- On the *tašriyh* 'dissection' of the *ḥandzarah* 'larynx' and the *lisān* 'tongue',
- On the detailed *ʔasbāb* 'causes' for each *ḥarf* 'letter' of the *ḥuruwf* 'letters' of the Arabs

<sup>1</sup>The author thanks professor Mohammad Alhawary for reading the entire treatise and making comments and suggestions on the style, the translation and the notes.

<sup>2</sup>This translation is based on the edition of ʔal-t<sup>f</sup>ayyān, Mohammad , h. and Yahya M. ʔalam. 1983. Damascus: Madʔmaʔ ʔal-luḡah ʔal-ʔarabiyyah. With their kind permission. This is the beginning of the Arabic text of the first of the two versions of the treatise of ʔibn Sīnā on phonetics.

رسالة أسباب حدوث الحروف  
الرواية الأولى

بسم الله الرحمن الرحيم  
رسالة عن أبي علي بن سينا في مخارج  
الحروف

(ص. ٥٣) الحمد لله وحده حمداً يستأهله  
بعظمة ذاته، وسعة رحمته، وفيضان جوده،  
وصلواته على نبيه محمد وآله.

وبعد: فليس كلُّ قابلٍ هديةٍ محتاجاً إليها، ولا  
كلُّ طالبٍ تحفةٍ (ص. ٥٤) فاقداً لها، بل  
رُبما أثر الغني في ذلك إكرام الفقير،  
وتوخّي الكبير به البسط من الصغير،  
والشيخ الكبير الكريم الأستاذ أبو منصور  
محمد بن علي بن عمر [ الجبّان - أدام الله  
فضله ] وهو الذي ما شئت، فله في نفسه من  
المحامد الباهرة، وعندي وفي ذمتي من  
المنن المتظاهرة - التمس مني التماساً باسطاً  
لا محتاج، أن أكتب باسمه ما حصل عندي  
بعد البحث المستقصى من أسباب حدوث  
الحروف باختلافها في المسموع في رسالة  
وجيزة جداً. فتأقيت ملتمة بالطاعة، وسألت  
الله [تعالى] أن يوقّني للصواب الزمّه  
والحقّ أتبعه، وهو ولي الرحمة.

وقد قسمت الكتاب فصلاً ستة [وهي هذه]:

(ص. ٥٥)

- أ. في سبب حدوث الصوت
- ب. في سبب حدوث الحروف
- ج. في تشريح الحنجرة واللسان
- د. في الأسباب الجزئية لحرفٍ حرفٍ من حروف العرب

- e. On the *ḥuruwf* ‘letters’ that are *šabiyhah* ‘similar’ to these *ḥuruwf* ‘letters’, but are not in the *luḡah* ‘language’ of the Arabs,
- f. On the fact that these *ḥuruwf* ‘letters’ may be heard in other than *ḥarakāt nuṭʿiqiyyah* ‘articulatory motions’.<sup>3</sup>

هـ. في الحروف الشبيهة بهذه الحروف  
[وليس في لغة العرب]  
و. في أنّ هذه الحروف قد تُسمع من  
حركاتٍ غير نُطقيّة.

<sup>3</sup>This thoughtful treatise includes not only the three modalities of phonetics: the acoustic, the articulatory/linguistic, and the anatomical/physiological but in addition, comparative phonetics and natural parallels. This global perspective would become common in more recent research and teaching in phonetics.

## The Treatise of ʔibn Sīnā on Phonetics-1

### The First Section-1

#### On the *sabab* ‘Cause’ of the *ḥuduḥ* ‘Occurrence’ of *ʔal-sʔawt* ‘the sound’

(P56) I think that the *sabab qariyb* ‘proximate cause’ of *ʔal-sʔawt* ‘the sound’ is the sudden *tamawwudʒ* ‘wave setting’ of the air with *surʔah* ‘speed’ and with *quwwah* ‘power’ from any *sabab* ‘cause’ whatsoever. As to what conditions *sʔawt* ‘sound’ with reference to *qarʔ* ‘striking’, it is not likely that it is *sababan kulliyān* ‘a total cause’ for *ʔal-sʔawt* ‘the sound’. Rather, it is like being *ʔakḥariy* ‘a majority one’. Then, if it were *sababan kulliyān* ‘a total cause’, it would be *baʔiyd* ‘a remote’ cause. It is not the *sabab mulāsʔiq* ‘contiguous cause’ for the *wudʒuḥ* ‘existence’ of *sʔawt* ‘sound’.<sup>4</sup>

The proof that the *qarʔ* ‘striking’ is not the *sababan kulliyān* ‘total cause’ of *ʔal-sʔawt* ‘the sound’, is that *sʔawt* ‘sound’ (p. 57) can also occur from the opposite of the *qarʔ* ‘striking’ which is the *qalʔ* ‘plucking’. And that is that the *qarʔ* ‘striking’ is a *taqriyb* ‘approximating’ of some *dʒirm* ‘object’, to another *dʒirm* ‘object’ opposed to it, to crowd it in, at close range, followed by a *ʔunf* ‘violent’ *mumāsātun* ‘contact’ due to the *surʔah* ‘speed’ of the *ḥarakah* ‘motion’ of the *taqriyb* ‘approximating’ and its power. Corresponding to this is the *tabʔiyd* ‘distancing’ of some *dʒirm* ‘object’ from another *dʒirm* ‘object’, in contact with it, with one flush against the other; by *tabʔiyd* ‘distancing’, *yanqaliʔu* ‘it plucks/pulls’ from contacting it, in *qalʔ ʔaniyf* ‘a violent pull’, due to the *surʔah* ‘speed’ of the *ḥarakah* ‘motion’ of *tabʔiyd* ‘distancing’. This is followed by a *sʔawt* ‘sound’ without there being *qarʔ* ‘a strike’.

<sup>4</sup>There is more elaboration on the causes of sound where the activities of the thoracic cavity are taken into account and the glottal cartilage, the epiglottis, is mentioned by name. In Qānuwn 2:225, thus: “The sound, its *fāʔil* ‘activator’ is the *ʔadʔal* ‘muscles’ that are at the *ḥandʒarah* ‘larynx’ commensurate with the *fath* ‘opening’, and with the pressing and *qarʔ* ‘striking’ of the expelled air, *ʔālatuhu* ‘its instrument’ is the *ḥandʒarah* ‘larynx’ and the *dʒism* ‘body’ that is like the *lisān ʔal-mizmār* ‘epiglottis’ which is the first true instrument, and the rest of the instruments *bawāʔiḥ* ‘are providers’ and *muʔiynāt* ‘auxiliaries’. The provider of *māddatihi* ‘its substance’ is *ḥādʒib* ‘diaphragm’ and the *ʔadʔal* ‘muscles’ of the *sʔadr* ‘chest’, and the *muʔaddi* ‘supplier’ of its substance is the *riʔah* ‘lung’, and its substance is the *ḥawāʔ* ‘air’ that *yumawwadʒ* ‘is set in a wave’ at the *ḥandʒarah* ‘larynx’.

## الفصل الأول في سبب حدوث الصوت

(ص. ٥٦) أظن أن الصوت سببه القريب تموج الهواء دفعة بسرعة وبقوة من أي سبب كان. والذي يشترط فيه من أمر القرع عساه ألا يكون سبباً كلياً للصوت، بل كأنه سببٌ أكثرى، ثم إن كان سبباً كلياً فهو سبب بعيد، ليس السبب الملاصق لوجود الصوت.

الدليل على أن القرع ليس سبباً كلياً للصوت أن الصوت قد (ص. ٥٧) يحدث أيضاً عن مقابل القرع وهو القلع. وذلك أن القرع هو تقريب جرم ما إلى جرم مقاوم له لمزاحمته تقريباً تتبعه مماسةً عنيفةً لسرعة حركة التقريب وقوتها. ومقابل هذا تبعيد جرم ما عن جرم آخر مماس له، منطبق أحدهما على الآخر، تبعيداً ينقلع عن مماسيته انقلاصاً عنيفةً لسرعة حركة التبعيد، وهذا يتبعه صوتٌ من غير أن يكون هناك قرع.

However, one thing is necessary in both cases, and that is *tamawwudʒ sariyʔ*, *ʔaniyʔ* ‘a fast and violent wave setting’ in the air. As to the *qarʔ* ‘striking’, the striker’s need of the air is that *yandʔayitʔ* ‘it be compressed’ and *yanfalit* ‘to escape’ from the *masāfah* ‘distance’ that the striker follows towards both sides with *ʔunf* ‘violence’ and *quwwah* ‘power’, and with *ʔiddah* ‘tightness’ and *surʔah* ‘speed’.<sup>5</sup> In the case of *qalʔ* ‘plucking’, the plucker’s need of the air is to suddenly push into the place (P.58) that the *maqluwʔ* ‘plucked one’ of the two has vacated, with *ʔunf wa quwwah* ‘violence and power’.

In both cases, it is necessary for the *mutabāʔad* ‘distanced’ air that it be directed towards the form and the *mawdʒ* ‘wave’ that occurs there, even if the *qarʔyyun* ‘strike-type’ is of greater extension than the *qalʔyyun* ‘pluck-type’. Then that *mawdʒ* ‘wave’ reaches the *sākin* ‘still’ air in the *sʔimāx* ‘auditory meatus’ and *yumawwidʒuhu* ‘sets it into a wave’, thereby the *ʔasʔabah* ‘nerve’, that is spread over its surface, senses it.

Therefore, *ʔal-ʔillah ʔal-qariybah* ‘the proximate cause’, as I think, is the *tamawwudʒ* ‘setting into a wave’; *tamawwudʒ* ‘setting into a wave’ has *ʔillatān* ‘two causes’: *qarʔ* ‘striking’ and *qalʔ* ‘plucking’.

If someone were to come along with the opinion that the *qalʔ* ‘plucking’ creates *qarʔ* ‘striking’ in the air, and sees it as the *sabab* ‘cause’ for the *sʔawt* ‘sound’, the weakness of this statement is such that it does not require that it be demonstrated.

ولكنّه إنّما يلزم في كلا الأمرين شيء واحد وهو تموج سريع عنيف في الهواء. أمّا في القرع فلاضطرار القارع الهواء إلى أن ينضغط وينفلت من المسافة التي يسلكها القارع إلى جنبتيها بعنف [وقوة] وشدة وسرعة، وأمّا في القلع فلاضطرار القالع الهواء إلى أن يندفع إلى المكان (ص. ٥٨) الذي أخلاه المقلوغ منها دفعة بعنف وشدة.

وفي الأمرين جميعاً يلزم المتباعد من الهواء أن ينقاد للشكل والموج الواقع هناك، وإن كان القرعي أشدّ انبساطاً من القلعي. ثم ذلك الموج يتأدّى إلى الهواء الراكد في الصّماخ، فيموجه فتحس به العصبه المفروشه في سطحه.

فإن العلة القريبة – كما أظنّ – هي التّموج: وللتّموج علتان: قرع وقلع.

وإن ذهبَ ذاهبٌ إلى أنّ القلع يحدث قرعاً في الهواء وراه هو السبب للصّوت فليس ضعفُ هذا القول مما يحتاجُ إلى أن يتكلّف لإبانتة.

<sup>5</sup>In both *qarʔ* ‘striking’ and *qalʔ* ‘plucking/pulling’, speed, violence, power and tightness are mentioned as a way of attaining sufficient vibratory motion/frequency for the waves to be produced and be heard as sounds. Frequency is not determined nor mentioned here.

## The Second Section-1

### On the *sabab* ‘cause’ of the occurrence of *ʔal-ḥuruwf* ‘the Letters’

(P.59) As for *ʔal-tamawwudʒ* ‘the wave setting’ itself, *yafʔalu* ‘it produces’ the *sʔawt* ‘sound’. As for the *ḥāl* ‘state’ of the *tamawwudʒ* ‘setting into a wave’ itself, it is due to the *ʔittisʔāl* ‘connectedness’ of its parts and *tamallusihā* ‘their smoothness’, or *tašadʔdʔiyahā* ‘their disconnectedness’ and *tašadʔdubihā* ‘their clipping’ that cause *ʔal-ḥiddah* ‘the sharpness’ and *ʔal-ḥiqal* ‘the heaviness’. As to *ʔal-ḥiddah* ‘the sharpness’, the first two produce it, and as for *ʔal-ḥiqal* ‘the heaviness’, the second two produce it.<sup>6</sup>

(P.60) As for the *ḥāl* ‘state’ of the *tamawwudʒ* ‘wave setting’, from the side of the situations of readiness of *maxāridʒ* ‘exists’ and *maḥābis* ‘obstructions’<sup>7</sup> that it makes use of in its *maslak* ‘path’, to produce the letter. The *ḥarf* ‘letter’ is *hayʔah* ‘a construct/form’ for the *sʔawt* ‘sound’ that displays it. It is clearly differentiated by it from another *sʔawt* ‘sound’ similar to it, in what is heard, in *ʔal-ḥiddah* ‘sharpness’ and *ḥiqal* ‘heaviness’.

Some of the letters are, in fact, *mufradah* ‘unitary’, and their occurrence is due to complete *ḥabasātun* ‘individual obstructions’ of the *sʔawt* ‘sound’, or the *hawāʔ* ‘air’ that is the producer of the *sʔawt* ‘sound’, that follows it with a sudden *ʔitʔlāq* ‘release’. Others are *murakkabah* ‘complex’, and *ḥuduwwuhā* ‘their occurrence’ is due to incomplete *ḥabasātun* ‘individual obstructions’, but follow *ʔitʔlāqātun* ‘individual releases’.

<sup>6</sup>There is a more extended discussion of these two topics of *ʔal-ḥiddah* and *ʔal-ḥiqal* in *šifāʔ* 3:10: “I have learned that the proximate cause of *ʔal-ḥiddah* ‘the sharpness’ is *talazzuz* ‘cramming together’, *malāsah* ‘smoothness’ of *saʔh* ‘surface’ and *tarāsʔi* ‘compressing together’ parts of the *mawdʒ* ‘wave’ of the *hawāʔ* ‘air’ carrying the *sʔawt* ‘sound’. As for *ʔal-ḥiqal* ‘the heaviness’, its cause is the opposites of that. The causes of the cause of *ʔal-ḥiddah* ‘the sharpness’ are *sʔalābah* ‘solidity’ of the struck opposition, or *malāsatihi* ‘its smoothness’, or *qasʔrihi* ‘its shortness’, or *ʔinḥirāfihi* ‘its deviation’, or *dʔiyqihī* ‘its narrowness’ if it were free of air, or *qurbihi* ‘its proximity’ to the *minfax* ‘bellows’, if it is also free of air. As for the causes of *ʔal-ḥiqal* ‘the heaviness’ are the opposite of that, i.e., of *liyn* ‘softness’, *xuṣuwnah* ‘roughness’, *tʔuwl* ‘length’, *raxāwah* ‘looseness’, *siʔah* ‘expanse’ and *buʔd* ‘distance’. If any of these causes is subject to *ziyādah* ‘increase’ or *nuqsʔān* ‘decrease’, then its increase requires the increasing what caused it and its decrease, requires decreasing what caused it, on a proportionate similarity.” What appears to be the concern of the author is the nature of the materials and the high frequency/pitch or low frequency/pitch sounds that are associated with different types of waves that they produce.

<sup>7</sup>It is useful to indicate that the terms *ḥabs* ‘obstruction/blockage’, *ḥabsah* ‘single obstruction’, *maḥbas* ‘blockage or place of obstruction’, *ḥābis* ‘obstructor’ all come from the same root and we need to differentiate them lest things become entangled.

## الفصل الثاني

### في سبب حدوث الحروف

(ص. ٥٩) أمّا نَفْسُ التَّمَوُّجِ فَإِنَّهُ يَفْعَلُ الصوتَ، وأمّا حال التَّمَوُّجِ فِي نَفْسِهِ مِنْ اتِّصَالِ أَجْزَائِهِ وَتَمَلُّسِهَا، أَوْ تَشْطِيبِهَا وَتَشْدُوبِهَا فَيَفْعَلُ الْحِدَّةَ وَالثَّقْلَ، أمّا الْحِدَّةُ فَيَفْعَلُهَا الْأَوْلَانُ، وَأَمَّا الثَّقْلُ فَيَفْعَلُهُ الثَّانِيَانِ.

(ص. ٦٠) وَأَمَّا حَالُ التَّمَوُّجِ مِنْ جِهَةِ الْهَيْئَاتِ الَّتِي يَسْتَقْبِدُهَا مِنَ الْخَارِجِ وَالْمَحَابِسِ فِي مَسْلِكِهِ فَيَفْعَلُ الْحَرْفَ. وَالْحَرْفُ هَيْئَةٌ لِلصَّوْتِ عَارِضَةٌ لَهُ يَتَمَيَّزُ بِهَا عَنْ صَوْتٍ آخَرَ مِثْلِهِ فِي الْحِدَّةِ وَالثَّقْلِ تَمَيُّزًا فِي الْمَسْمُوعِ.

وَالْحُرُوفُ بَعْضُهَا فِي الْحَقِيقَةِ مَفْرَدَةٌ، وَحُدُوثُهَا عَنْ حَبْسَاتٍ تَامَّةٍ لِلصَّوْتِ أَوْ الْهَوَاءِ الْفَاعِلِ لِلصَّوْتِ، يَتْبَعُهَا إِطْلَاقٌ دَفْعَةً. وَبَعْضُهَا مَرَكَّبَةٌ وَحُدُوثُهَا عَنْ حَبْسَاتٍ غَيْرِ تَامَّةٍ لَكِنْ تَتَّبِعُ إِطْلَاقَاتٍ.

The *mufradah* ‘unitary’ letters are: (p. 61) *bāʔ* [ b ], *tāʔ* [t], *dʒim* [dʒ]<sup>8</sup>, *dāl* [d.] *dʿād* [dʿ], also after a fashion, *tʿāʔ* [tʿ], *qāf* [q], *kāf* [k], *lām* [l], *miym* [m], and *nuwn* [n], also after a fashion. The rest of them are *murakkabah* ‘complex’, and occur due to *ḥabasātin* *ḡayr tāmmah* ‘incomplete individual obstructions’, but the *ḥabs* ‘obstruction’ and the *ʔitʿlāq* ‘release’ are simultaneous. You may enumerate them individually<sup>9</sup>.

These *mufradah* ‘unitary ones’ share in the fact that *wudʒuwdahā* ‘their existence’ and *ḥuduwhāhā* ‘their occurrence’ is in the duration that separates the time of the *ḥabs* ‘obstruction’ from the time of the *ʔitʿlāq* release. The reason for that is, that during the time of *ʔal-ḥabs ʔal-tām* ‘the complete obstruction’, it is not possible that a *sʿawt* ‘sound’ can occur, caused by the air that *musakkan* ‘is kept still’ by the *ḥabs* ‘obstruction’. *Zamān* ‘time’ of the release, during it, nothing of these *ḥuruwf* ‘letters’ is heard, because they do not *tamtaddu* ‘extend’ at all, rather, (p.62), they exist with the removal of *ʔal-ḥabs* ‘the obstruction’, only.

As for the other letters, they share the fact that *tamtaddu zamānan* ‘they extend for a time’, and *tafnā* ‘evanesce’ at the time of *ʔal-ʔitʿlāq ʔal-tām* ‘the complete release’. They, however, extend during the *zamān* ‘time’ in which the *ḥabs* ‘obstruction’ and the *ʔitʿlāq* ‘release’ come together.

After the sharing of each of the *tʿabaqatayn* ‘two layers’ in the general *ʔillah* ‘reason/cause’, they may differ because of the the different *ʔadʒrām* ‘objects’ at which and by means of which the *ḥabs* ‘obstruction’ and *ʔitʿlāq* ‘release’ occur. They may be *ʔalyan* ‘softer’, or they may be *ʔasʿlab* ‘more solid’, or they may be *ʔaybas* ‘drier’, or they may be *ʔartʿab* ‘more moist’, or may be the *ḥabs* ‘obstruction’ was within the same *rutʿuwbah* ‘moisture’ that bursts, then it bursts either with *ʔinfisʿāl* ‘separation’ and *ʔimtidād* ‘extension’ or in its place.

<sup>8</sup> The *dʒiym* [dʒ] is included with the stops, but its description is more complex than that of the others, cf. Chapter 4 below.

<sup>9</sup> The *murakkabah* ‘complex’ are the balance of the letters: *ʔalif* [ā], *hamzah* [ʔ], *hāʔ* [h], *hāʔ* [ḥ], *ʔayn* [ʔ], *xāʔ* [x], *ḡayn* [ḡ], *šayn* [š], *ḍāl* [ḍ], *ḍʿāʔ* [ḍʿ], *rāʔ* [r], *zāy* [z], *sāʔ* [s], *sʿād* [sʿ], *ḥāʔ* [ḥ], *fāʔ* [f], *wāw* [w], *yāʔ* [y].

الحروف المفردة هي : (ص. ٦١)  
الباء، والتاء، والجيم، والدال، والصاد،  
أيضاً من وجه، والطاء، والقاف، والكاف،  
واللام، والنون أيضاً من وجه.

ثم سائر ذلك مركبة تحدث عن حساباتٍ غير  
تامة، بل يكون الحبس مع الإطلاق معاً،  
ولك أن تعدّها عدداً. وهذه المفردة تشترك في  
أن وجودها وحدوثها في الآن الفاصل بين  
زمان الحبس وزمان الإطلاق، وذلك لأنّ  
زمان الحبس التام لا يمكن أن يحدث فيه  
صوتٌ حادثٌ عن الهواء وهو مسكّن  
بالحبس. وزمان الإطلاق ليس يُسمع فيه  
شيءٌ من هذه الحروف لأنّها لا تمتدّ البتّة،  
إنما (ص. ٦٢) هي مع إزالة الحبس فقط.

وأما الحروف الأخرى فإنّها تشترك في أنّها  
تمتدّ زماناً وتقنى مع زمان الإطلاق التام،  
وإنّما تمتدّ في الزمان الذي يجتمع فيه  
الحبس مع الإطلاق.

وبعد اشتراك كلِّ واحدةٍ من الطبقتين في  
العلة العامية فقد تختلف بسبب اختلاف  
الأجرام التي يقع عندها وبها الحبس  
والإطلاق: فإنّها ربّما كانت أليين، وربّما  
كانت أصلب، وربّما كانت أيبس، وربّما  
كانت أرطب، وربّما كان الحبس في نفس  
رطوبةٍ تتفق ثم تتفقاً إما مع انفصال  
وامتداد، وإما في مكانها.

(P.63) *ʔal-ḥābis* ‘the obstructor’ may be *ʔasʔar* ‘smaller’ or *ʔaʔḏʔam* ‘grander’, *ʔal-maḥbuws* ‘the obstructed one’ may be more or less, and *ʔal-maxradʒ* ‘the exit’ may be *ʔadʔyaq* ‘narrower’ or *ʔawsaʔ* ‘wider’, *mustadiyr* ‘circular’ in shape, or *mustaʔridʔ* ‘flat’ in shape with precision, and the *ʔal-ḥabs* ‘the obstruction’ is *ʔašadd* ‘tighter’ or *ʔalyan* ‘softer’, and *ʔal-dʔaytʔ* ‘the pressure’ after the release is *ʔaḥfaz* ‘more abrupt’ or *ʔaslas* ‘more fluent’. A demonstration from us, for each of these parts, in detail, is forthcoming.

(ص. ٦٣) وقد يكون الحابس أصغر وأعظم، والمحبوس أكثر وأقل، والمخرج أضيق وأوسع ومستدير الشكل ومستعرض الشكل مع دقة، والحبس أشد وألين، والضغط بعد الإطلاق أحفز وأسلس. وسيأتي مثا البيان لواحد واحد من هذه الأقسام بالتفصيل.

### The Third Section-1

#### On the *tašriḥ* ‘dissection’ of *ʔal-handzarah* ‘the larynx’ and *ʔal-lisān* ‘the tongue’,<sup>10</sup>

(P. 64) As for *ʔal-handzarah* ‘the larynx’<sup>11</sup>, it is constructed out of three *ʔadʔāriyf* ‘cartilages’. One of them is situated at the *quddām* ‘front’. It is accessible to touch in extremely emaciated persons, at the upper part of *ʔal-ʔunuq* ‘the neck’, under *ʔal-ḍaqan* ‘the chin’. Its shape is the shape of a *qasʔah* ‘bowl’ with *ḥadbatuhu* ‘its concavity’ towards *xāridz* ‘outside’ and *quddām* ‘front’, and *taʔqiyruhu* ‘its convexity’ towards *dāxil* ‘inside’ and *xalf* ‘back’. It is called the *daraqiy* ‘shield-like’<sup>12</sup> and *tursiy* ‘disk-like’<sup>13</sup> *ʔadʔruwf* ‘cartilage’

(P.65) The second *ʔadʔruwf* ‘cartilage’ is behind it, with *satʔhuhu* ‘its surface’ facing *satʔhihi* ‘its surface’, attached to it<sup>14</sup> by *ribātʔāt* ‘ligaments’<sup>15</sup>, *yusrah* ‘at left’ and *yumnah* ‘at right’, but it is separated from it<sup>16</sup> from above. It is called *ʔadiym ʔal-ʔism* ‘lacking-a-name’<sup>17</sup>.

The third cartilage is like a *qasʔah* ‘bowl’ inverted over the two of them.<sup>18</sup> It is separated from the *daraqiy* ‘shield-like/thyroid’, attached to the *lā ʔisma lahu* ‘lacking-a-name/cricoid’, posteriorly, by a double joint<sup>19</sup> made up of *zāʔidatayn* ‘two extensions’ rising from the one that is *lā ʔisma lahu* ‘lacking-a-name/cricoid’ to rest at the *nuqratayn* ‘two sockets’ in it. It is called *ʔal-mukibbiy* ‘the inverted’ or *ʔal-ʔirdzihāliy* ‘the arytenoid’<sup>20</sup>.

<sup>10</sup>Thanks to Dr. Patrick Mahat, M.D., P.C. for looking over the material in this chapter.

<sup>11</sup>In the Qānuwn:p.1/44 it is stated: “*ʔal-handzarah* ‘the larynx’ is a cartilaginous organ making up the *ʔālah* ‘instrument’ for sound and it is made up of three cartilages the *daraqiy* ‘shield-like/thyroid’ or the *tursiy* ‘disk-like’, the one *ʔadiym ʔal-ʔism* ‘lacking-a-name/cricoid’ and the *ʔal-mukibbiy* ‘the inverted’ or *ʔal-ʔardzihāliy* ‘the arytenoid’.”

<sup>12</sup>i.e. the thyroid cartilage.

<sup>13</sup>i.e. the thyroid cartilage.

<sup>14</sup>The thyroid cartilage.

<sup>15</sup>I.e. crico-thyroid ligaments.

<sup>16</sup>The thyroid cartilage.

<sup>17</sup>The cricoid cartilage

<sup>18</sup>i.e. the two cartilages are the thyroid and the cricoid cartilages.

<sup>19</sup>Crico-arytenoid joints.

<sup>20</sup>This description does not distinguish the two arytenoid cartilages, except by implication when it mentions the two sockets where they rest. The description seems to lump them together as one cartilage that gives it its *mukibbiy* ‘bowl-like’ shape.

### الفصل الثالث في تشريح الحنجرة واللسان

أما الحنجرة فإِنَّها مركبة من غضاريف ثلاثة: أحدهما موضوعٌ إلى قُدَّامِ يَنالُه المسُّ في المهازيلِ جدًّا عند أعلى العُنُقِ تحت الدَّقْنِ، وشكلُه شكلُ القَصْعَةِ حدَّبَتْه إلى خارجٍ وإلى قُدَّامٍ، وتقعُيرُه إلى داخلٍ وإلى خلفٍ، ويسمى الغضروفُ الدَّرْقِيّ والثَّرْسِيّ.

(ص. ٦٥) والغضروفُ الثاني خلفه، مقابلٌ سطحه لسطحه، متصلٌ به بالرباطات يمنة ويسرةً، ومنفصلٌ عنه إلى فوق، ويسمى عديم الاسم.

الغضروفُ الثالثُ كقصعةٍ مكبوبةٍ عليهما، وهو منفصلٌ عن الدَّرْقِيّ مربوطٌ بالذي لا اسم له من خلفٍ بمفصلٍ مضاعفٍ يحدثُ من زائدتين تصعدان من الذي لا اسم له وتستقرَّان في نُقرتين له، ويسمى المُكْبَبِيّ والطَّرْجِهَالِيّ.



If the one that is *lā ʿisma lahu* ‘lacking-a-name/cricoid’ approximates the *daraqiy* ‘shield-like/thyroid’ and joins it<sup>21</sup>, *tadʿiyiq* ‘a narrowing’ by it occurs in the *handzarah* ‘larynx’<sup>22</sup>. But if it<sup>23</sup> pushes away from it<sup>24</sup>, and *bāʿadahu* ‘distances itself from it’, from this, *ʿittisāʿ* ‘a widening’ of *ʿal-handzarah* ‘the larynx’ is produced<sup>25</sup>. From (p.66) its<sup>26</sup> *taqārub* ‘approximating’ and *tabāʿud* ‘distancing’, *ʿal-hādd* ‘the sharp’ and *ʿal-ḥaqiyl* ‘the heavy’, *sʿawt* ‘sound/s’ are produced.

If *ʿal-tʿirdzihāliy* ‘the arytenoid’ were to cover the *daraqiy* ‘shield-like/thyroid’, *ʿal-naḥas* ‘the breath’ *ḥusʿir* ‘is trapped’ and the *fuwwahah* ‘aperture’<sup>27</sup> is closed. If it is taken off of it, the *ʿal-handzarah* ‘the larynx’ is opened<sup>28</sup>. There are, therefore, *ʿadʿalāt* ‘muscles’ here that attach *ʿal-tʿirdzihāliy* ‘the arytenoid’ to the *daraqiy* ‘shield-like/thyroid’<sup>29</sup> and attract it to it; there are *ʿadʿalāt* ‘muscles’ that distance it from it and attract it to the *xalf* ‘rear’<sup>30</sup>; there are *ʿadʿalāt* ‘muscles’ that attach the *lā ʿisma lahu* ‘lacking-a-name/cricoid’ to the *daraqiy* ‘shield-like/thyroid’<sup>31</sup>; and there are *ʿadʿalāt* ‘muscles’ that separate one from the other.<sup>32</sup>

*ʿal-tʿirdzihāliy* ‘the arytenoid’ is mounted on the *lā ʿisma lahu* ‘lacking-a-name/cricoid’ with a double joint, because it has *nuqratayn* ‘two sockets’<sup>33</sup> to which *zāʿidatān* ‘two extensions’ rise from the *lā ʿisma lahu* ‘lacking-a-name/cricoid’ and rest in them-d.

فإذا تقارب الذي لا اسم له من الدَّرقي وضامه حدث منه تضيقُ الحنجرة، وإذا تحيَّ عنه وبعده حدث منه اتساعُ الحنجرة. ومن (ص. ٦٦) تقاربه وتباعده يحدث الصوتُ الحادُّ والثَقيلُ.

وإذا انطبق الطَّرجھالي على الدَّرقي حصر النَّفَس وسجَّ الفُوْهَة، وإذا انقلع عنه انفتحت الحنجرة، فيكون إذن هاهنا عضلاتٌ تلتصقُ الطَّرجھالي بالدَّرقي وتجذبه إليه، وعضلاتٌ تبعده عنه وتجذبه إلى خلف، وعضلاتٌ تلتصقُ الذي لا اسم له بالدَّرقي، وعضلاتٌ تُنحِّي أحدهما عن الآخر.

والطَّرجھالي مركَّبٌ على الذي لا اسم له بمفصلٍ مضاعفٍ لأنَّ فيه نُقْرَتَيْنِ تصعد إليهما زائدتان من الذي لا اسم له وتستقرَّان فيهما.

<sup>21</sup>This is accomplished by the contraction of the crico-thyroid muscles.

<sup>22</sup>Even though different details are spelled out in ʿIbn Sīnā, this approximation is caused by the tensing of the crico-thyroid muscles. This tenses the vocal folds and brings them closer to each other. He considers the approximation only in terms of the cartilages getting closer together.

<sup>23</sup>The lacking-a-name/cricoid cartilage.

<sup>24</sup>The *daraqiy* ‘shield-like/thyroid’ cartilage.

<sup>25</sup>When the cricoid and thyroid cartilages are farther apart, the vocal folds will be more relaxed and the opening will be larger. The size of the cartilages does not change, but their relative positions, due to the activity of the muscles, changes. Nowadays the closure of the larynx is attributed more precisely to the muscles in different positions than to the cartilages.

<sup>26</sup>The lacking-a-name/cricoid cartilage.

<sup>27</sup>i.e. the opening of the glottis.

<sup>28</sup>ʿIbn Sīnā figures that the two arytenoids bend over the thyroid and block its opening. The current wisdom says that the process of closing the larynx is accomplished into two stages, by closing the space between the arytenoids and the space between the vocalis muscles.

<sup>29</sup>The thyro-arytenoid muscles.

<sup>30</sup>The posterior crico-arytenoid muscles pull the arytenoids back (and open the larynx).

<sup>31</sup>i.e. the crico-thyroid muscles.

<sup>32</sup>Though not mentioned, external laryngeal muscles like thyro-hyoid and stylo-hyoid muscles perform such a function.

<sup>33</sup>This is a recognition of two crico-arytenoids and the two sockets of the arytenoid, though he still considered the cartilages as one.

The *ʔadʔalāt* ‘muscles’ that open *ʔal-ḥandʔarah* ‘the larynx’ as a result of the moving away of *ʔal-tʔirdʔihāliy* ‘the arytenoid’ from the *daraqiy* ‘shield-like/thyroid’, it is necessary that they rise from below and from the side of the *lā ʔisma lahu* ‘lacking-a-name/cricoid’, and reach the end of *ʔal-tʔirdʔihāliy* ‘the arytenoid’<sup>34</sup>. If they were *tašannadʔat* ‘to contract’, they would pull it back, and would separate between it and the *daraqiy* ‘shield-like/thyroid’. For this purpose, four *ʔadʔalāt* ‘muscles’ of this type were created, followed by (p.67) two muscles that join, not at the back, but rather to the right and left of it<sup>35</sup>. If these two *ʔadʔalāt* ‘muscles’ were *tašannadʔatā* ‘to contract’, they would cause, with help of the opening muscles, an enlarged widening. So, there are six muscles.<sup>36</sup>

The muscles that *tutʔbiq* ‘cover’ are, of necessity and inevitably, connected between the *tursiy* ‘disk-like/thyroid’ and *ʔal-tʔirdʔihāliy* ‘the arytenoid’<sup>37</sup>, so that if they were *tašannadʔat* ‘to contract’, they would extend *ʔal-tʔirdʔihāliy* ‘the arytenoid’ toward the *tursiy* ‘disk-like/thyroid’<sup>38</sup>. It is known that if they were from inside, their closure would be *ʔašadd* ‘tighter’ and *ʔaḥkam* ‘more secure’. They were made like that. Of these, there is a pair of muscles found in all people. One of the two (p. 68) ascends from the *ḥāffah* ‘edge’ of the *daraqiy* ‘shield-like/thyroid’ to the edge of *ʔal-tʔirdʔihāliy* ‘the arytenoid’ on the right, and the other on the left<sup>39</sup>. They are two small ones. With their shortness and the strategic location, they perform a great act to such an extent that they oppose the muscles of the chest<sup>40</sup> and the diaphragm when *ḥasʔr* ‘trapping’ the *nafas* ‘breath’. There may be, in some people, another pair similar and auxiliary to them.

فالعَضَلات التي تفتح الحَنجَرَ بتَحِيَةِ الطَّرْجِهالي عن الدَّرقي لا بدَّ من أن تكون طالعة من أسفل ومن جَنِبَةِ الذي لا اسم له، وتتصل بمؤخَّر الطَّرْجِهالي، فإذا تشَجَّتْ، جَدَّبَتْهُ إلى خلف، وفرَّقت بينه وبين الدَّرقي، وقد خُلقت لذلك أربع عضلاتٍ على هذه الصِّفة، وأرِفِدت (ص. ٦٧) بعضاتين تتصلان لا عند الخلف من الطَّرْجِهالي بل يَمَنَّةً منه ويسرَّةً، وإذا تشَجَّتْنا فعلتاً مع المعونة في الفتح توسيعاً مستعرضاً فهذه ستُّ عضلات.

والعضلات التي تُطبقُ يجبُ أن تكون لا محالة واصلةً بين الثَّرسي والطَّرْجِهالي، حتى إذا تشَجَّتْ مدَّت الطَّرْجِهالي إلى الثَّرسي. ومعلومٌ أنَّها إذا كانت من داخل كان إطباقها أشدَّ وأحكم، وقد خُلقت كذلك. فمنها زوجُ عضلةٍ توجدُ في جميع الناس، أحدُ فرديها (ص. ٦٨) يصعدُ من حافة الدَّرقي إلى حافة الطَّرْجِهالي [يمنةً] والآخر يسرَّةً، وهما صغيرتان تفعلان بالقصر وبموافقة المكان فعلاً عظيماً حتى إنه يقاومُ عضلَ الصِّدر والحجابِ عند حَصْرِ النَّفس، وقد يوجدُ في بعض الناس زوجٌ آخرٌ شبيهٌ به معينٌ له.

<sup>34</sup>The posterior crico-arytenoid muscles pull the arytenoids back and laterally and open the larynx.

<sup>35</sup>If the muscles intended are the lateral crico-arytenoids, their contraction has the effect of closing/narrowing, not widening, the laryngeal opening. (Zemlin. 1988: p. 131)

<sup>36</sup>It is easy to get confused here when all the configurations of the larynx are postulated on the basis of the adjustments of the laryngeal cartilages and not the muscles. Opening, closing, expanding the glottis is stated in terms of different degrees of approximation of the cartilages to each other.

<sup>37</sup>i.e. the thyro-arytenoid muscles.

<sup>38</sup>In Qanuwn 1:44 it is stated: “as for the muscles *ʔal-mutʔ biqah* ‘that cover’, it would be more advantageous if they were to be inside the *hangdʔarah* ‘larynx’ so that when they contract they would pull *ʔal-tʔirdʔihāliy* ‘the arytenoids’ downward and cover it.”

<sup>39</sup>The thyro-arytenoid/vocalis muscles.

<sup>40</sup>Intercostal muscles.

As for those that *mudʿayyiqah* ‘narrow’ *ʔal-ḥandzarah* ‘the larynx’<sup>41</sup>, it is known that a general *dʿām* ‘closer’, in the best of cases, (p.69) be enclosing the *mutadʿāmayn* ‘two closers’ together, so that if they were *taqabbadʿa* ‘to constrict’ they would join together. That is the way the closing muscles were created. Among them there is a pair that originates in the bone that is similar to the *lām* ‘[ʕ]’<sup>42</sup>, in the writing of the Greeks. It is a bone that is triangular in shape, in its surfaces. It reaches the *daraqiy* ‘shield-like/thyroid’ width-wise, and each of its sides extends until it reaches beyond the *mariyʔ* ‘esophagus’, both on the right and the left, to meet the other and connect to it<sup>43</sup>. And four muscles, they may be distinguished or put together in two double pairs, or two pairs, one internal and one external, whichever is the case, they reach the *daraqiy* ‘shield-like/thyroid’<sup>44</sup>, then rap behind it around the *lā ʔisma lahu* ‘lacking-a-name/cricoid’.

As for the ones that *muwassifah* ‘widen’ the larynx, it is known that their multiplicity is great in number, because the muscles of the *sʿadr* ‘chest’<sup>45</sup> and the *hidzāb* ‘diaphragm’ expel the air to the outside with *ʔunf* ‘violence’. That could be, if one is limited to them, sufficient in opening the *ḥandzarah* ‘larynx’<sup>46</sup>.

Among the muscles of *fath* ‘opening’, there is a pair of muscles that comes from the bone that is similar to *lām* ‘[ʕ]’, it reaches (p.70) the full front of the *daraqiy* ‘shield-like/thyroid’<sup>47</sup>. If it *tašannadza* ‘were to contract’, it would pull it upwards and forward, and thus free it from contacting the *lā ʔisma lahu* ‘lacking-a-name/cricoid’.

وَأَمَّا الْمُضَيِّقَةُ لِلْحَنْجَرَةِ فَمِنَ الْمَعْلُومِ أَنَّ الضَّامَّ الْجَامِعَ أَحْسَنُ أَحْوَالِهِ أَنْ (ص. ٦٩) يَكُونَ مُحِيطًا بِالْمُتَضَامِّينَ جَمِيعًا، حَتَّى إِذَا تَقَبَّضَ ضَمًّا. وَكَذَلِكَ خُلِقَتْ عَضَلَاتُ الضَّمِّ، فَمِنَ ذَلِكَ زَوْجٌ يَأْتِي مِنَ الْعِظْمِ الشَّبِيهِ بِاللَّامِ فِي كِتَابَةِ الْيُونَانِيِّينَ، وَهُوَ عِظْمٌ مُتَلَثُّ الشَّكْلِ الَّذِي لَسَطُوحِهِ، فَيَتَّصِلُ بِالذَّرْقِيِّ عَرْضًا، وَيَمْضِي كُلُّ وَاحِدٍ مِنْ فَرْدِيهِ حَتَّى يَجَاوِزَ الْمَرِيءَ يَمَنَةً وَيَسْرَةً وَيَلْقِي الْآخَرَ وَيَتَّصِلُ بِهِ. وَأَرْبَعُ عَضَلَاتٍ رُبَّمَا فُرِّقَتْ وَرُبَّمَا جَمَعَتْ فِي زَوْجَيْنِ مُضَاعَفَيْنِ، أَوْ زَوْجَيْنِ أَحَدُهُمَا بَاطِنٌ وَالْآخَرُ ظَاهِرٌ، وَكَيْفَ كَانَ فَإِنَّهَا تَتَّصِلُ بِالذَّرْقِيِّ ثُمَّ تَلْتَفُّ وَرَاءَهُ عَلَى الَّذِي لَا اسْمَ لَهُ.

وَأَمَّا الْمَوْسِعَةُ لِلْحَنْجَرَةِ فَمِنَ الْمَعْلُومِ أَنَّ عَنْ تَكَثُّرِهَا بِالْعَدَدِ غَنَى، لِأَنَّ عَضَلَ الصَّدْرِ وَالْحِجَابِ تَحْفَظُ النَّفْسَ إِلَى خَارِجِ بَقْوَةٍ، فَيَكُونُ ذَلِكَ لَوْ اقْتَصِرَ عَلَيْهِ كَافِيًا فِي فَتْحِ الْحَنْجَرَةِ.

فَمِنَ عَضَلِ الْفَتْحِ زَوْجٌ عَضَلَةٌ يَأْتِي مِنَ الْعِظْمِ الشَّبِيهِ بِاللَّامِ، فَيَتَّصِلُ (ص. ٧٠) بِمَقْدَمِ الذَّرْقِيِّ كُلِّهِ. فَإِذَا تَشَنَّجَ جَذْبَهُ إِلَى فَوْقِ وَإِلَى قُدَّامِ، فَبِرَّأَهُ عَنِ مَلَاصِقَةِ الَّذِي لَا اسْمَ لَهُ.

<sup>41</sup>i.e. the inter-arytenoid and the lateral crico-arytenoid muscles.

<sup>42</sup>i.e. the hyoid bone.

<sup>43</sup>i.e. the crico-pharyngeus muscles.

<sup>44</sup>There are 22/23 muscles (Zemlin. 1988. P. 102) that have their origins or insertion at the hyoid bone. The pair most intimately connected to laryngeal functions is thyro-hyoid muscles. The complex muscles mentioned here that proceed from the hyoid to the thyroid and wrap around the cricoid, seem to be a set of them and not a single muscle.

<sup>45</sup>The (internal) intercostal muscles.

<sup>46</sup>The widening of the larynx is attributed to the pressure of the air exerted by the thoracic musculature, specifically the diaphragm and the intercostal muscles, though these are not specified.

<sup>47</sup>i.e. the thyro-hyoid muscles.

Among those there is a pair common between *ʔal-handʕarah* ‘the larynx’ and *ʕal-ḥulquwm* ‘the throat’, rises from *ʔal-qasʕsʕ* ‘the sternum’ and goes beyond the *daraqiy* ‘shield-like/thyroid’<sup>48</sup> and continues towards the rear of the *lā ʔisma lahu* ‘one lacking-a-name/cricoid’ and the front of *ʔal-ḥulquwm* ‘the throat’<sup>49</sup>. If it *tašannadʕa* ‘were to contract’, it would pull the *ḥulquwm* ‘throat’ down, and the *lā ʔisma lahu* ‘lacking-a-name/cricoid’ to the back. It separates between it and the *daraqiy* ‘shield-like/thyroid’. It may be aided in some individuals by another pair, similar to it, but that is rare. It is found in individuals with large larynges, but in big animals, always.

As for the *lisān* ‘tongue’, upon investigation, it is set in motion by eight muscles. Two of the muscles<sup>50</sup> come from *ʔal-zawāʔid ʔal-sahmiyyah* ‘the arrow extension’<sup>51</sup> that are near the ears both from the right and the left, and reach the sides of the *lis-n* tongue’, so that if *tašannadʕatā* ‘the two of them were to contract’ they would broaden/flatten it<sup>52</sup>. Of them, there are two muscles that come from the upper part of the bone that is similar to *lām* ‘[ʕ]’, and penetrate to the center of the tongue<sup>53</sup>. If *tašannadʕatā* ‘they were to contract’, (p.71) they would pull the bulk of the tongue forward, so that the *dʕirm* ‘object/body’ of the tongue follows them, as a consequence the tongue extends and lengthens<sup>54</sup>. Of these, there are two muscles<sup>55</sup> that come from the two lower branches of the branches of this bone<sup>56</sup>, they penetrate between the two broadeners and the two lengtheners, and due to them, *tawriyb* ‘curling’ of the tongue comes about. Of these, there are two muscles situated under these<sup>57</sup>, if *tašannadʕatā* ‘they-d were to contract’, *batʕʕahatā* ‘they-d would flatten’ the tongue. As to inclining it upward and inward that is due to the action of the *muʕarradʕah* ‘broadeners’ and the *muwarribah* ‘depressors/curlers’ (*Qanuwn* 1:45)<sup>58</sup>.

<sup>48</sup>i.e. the sterno-thyroid muscles.

<sup>49</sup>This is not a very clear designation of a set of muscles. There is more than one set of muscles that originates with the sternum and course towards the laryngeal structures that affect the geometry of the cartilages of the larynx in different ways with their complex maneuvers.

<sup>50</sup>Stylo-glossus muscles.

<sup>51</sup>i.e. the styloid processes.

<sup>52</sup>One may add here that this pair of muscles pulls the tongue back and upwards also.

<sup>53</sup>i.e. the hyo-glossus muscles. In *Qanuwn*, p 1/45, it is stated: “they are connected to the *ʔasʕl* ‘root’ of the tongue.”

<sup>54</sup>This set of muscles seems to be performing the function of the genio-glossus muscles also.

<sup>55</sup>*Qanuwn* p.1:45 “and two of them set in motion the curling, their origin is from the lower branch of the branches of the *lām* [ʕ] bone.”

<sup>56</sup>i.e. the trasversal muscles of the tongue.

<sup>57</sup>i.e. vertical muscles of the tongue.

<sup>58</sup>In *Qanuwn* p.1:45 it is stated: “it may be mentioned in the sum of the muscles of the tongue, a single muscle that reaches between the tongue and the *lām* [ʕ]/hyoid bone, and attracts each of them to the other.”

ومن ذلك زوجٌ مشتركٌ بين الحَجْرَةِ والحُقُومِ ، يصعدُ من القَصِّ ويجاوزُ الدَّرْقِي، ويستمرُّ إلى مؤخَّرِ الذي لا اسمَ له ومقدِّمِ الحُقُومِ ، فإذا تشنَّجَ جذبَ الحُقُومِ إلى أسفلَ والذي لا اسمَ له إلى خلفَ ، ففرَّقَ بينه وبين الدَّرْقِي ، وربَّما عَضَدَه في الفردِ من الناسِ زوجٌ آخرٌ شبيهُ به وهو نادرٌ ، ويوجدُ في عظيمي الحناجرِ من الناسِ ، وأمَّا في الدوابِّ الكبارِ فدائمًا .

وأما اللِّسانُ فيحرِّكُهُ عندَ التحقيقِ ثماني عضلاتٌ ، منها عضلتانِ تَأْتِيانِي من الزوائدِ السهمية التي عندَ الأذانِ يَمْنَةً وَيَسْرَةً ، وتتصلانِ بجانبِي اللِّسانِ فإذا تشنَّجتا عرَّضتاه . ومنها عضلتانِ تَأْتِيانِ من أعالي العظمِ الشبيهِ باللامِ وتنفذانِ في وسطِ اللِّسانِ ، فإذا تشنَّجتا جذبتا ( ص . ٧١ ) جُمَّةَ اللِّسانِ إلى فُدَامِ فَتَبِعَهُمَا جِرْمُ اللِّسانِ وامتدَّ وطال . ومنها عضلتانِ تَأْتِيانِ من الضِّلَعَيْنِ السافِلَيْنِ من أضلاعِ هذا العظمِ ، تنفذانِ بين المعرَّضَتَيْنِ والمطولَتَيْنِ ، ويحدثُ عنهما توريبُ اللِّسانِ . ومنها عضلتانِ موضوعتانِ تحتَ هاتينِ ، إذا تشنَّجتا بطحتا اللِّسانِ . وأمَّا تمثيلُهُ إلى فوقِ وداخلاً فمِنَ فعلِ المعرَّضَةِ والمورِّبَةِ .

## The Fourth Section-1 On ʔal-ʔasbāb ʔal-dzuzʔiyyah ‘the detailed causes’ for each *ḥarf* ‘letter’ of the letters of the Arabs

[ʔ]: (p.72) As for *ḥamzah* [ʔ], it occurs from a strong *ḥafz* ‘push’ from the *hidzāb* ‘diaphragm’ and the *ʔadʔal* ‘muscles’ of the *sʔadr* ‘chest’ to much air, and from the *ḥasʔr* ‘trapping’ of the resistant *tʔirdzihāliy* ‘arytenoid’ to the push of the air for a short time, then pushing it towards *ʔinqilāʔ* ‘release’ by means of the opening *ʔadʔalāt* ‘muscles’ and the air *dʔaytʔ* ‘pressure’ together.

[h]: As for *ḥāʔ* [h], it occurs from a similar *kamm* ‘amount’ and *kayf* ‘manner’ of air *ḥafz* ‘push’ except that the *ḥabs* ‘obstruction’ is not *ḥabsan tāmmān* ‘a complete obstruction’ but is caused by the *ḥāffāt* ‘edges’ of the *maxradz* ‘exit’ that render the *sabiyl* ‘path’ open, and the *ʔindifāʔ* ‘displacement’ contacts *ḥāffātihi* ‘its edges’ equally not leaning except towards the *wasatʔ* ‘center’.

[ʔ]: As for *ʔayn* [ʔ], the *ḥafz* ‘push’ of the air produces it with the absolute opening of the *tʔirdzihāliy* ‘arytenoid’ cartilages, and the opening of the *lā ʔisma lahu* ‘un-named’<sup>59</sup> cartilage, centrally, (p.73) and sending the air upwards to be repeated at the center of *ruʔuwbah* ‘a moisture’<sup>60</sup> in which it rolls without its being partial to a specific side before the *ḥafz* ‘push’ of air.

[h]: *ḥāʔ* [h] is similar to it<sup>61</sup>, except that the opening of the *lā ʔisma lahu* ‘un-named/cricoid’ is narrower, and the air does not rush straight ahead, but bends towards the outside in such a manner that it constrains the *ruʔuwbah* ‘moisture’ and sways it forward, and a *ḥāʔ* [h] occurs from the stirring up of its parts forward.

[x]: As for *xāʔ* [x], it occurs from a strong *dʔaytʔ* ‘pressure’ of the air, at the common boundary between the *lahāt* ‘uvula’ and the *ḥanak* ‘palate’, with a release, that, in between which, *yahtazz* ‘oscillates’ *ruʔuwbat* ‘moistures’, which the *tahriyk* ‘motion’ forces forward. And whenever it is about to obstruct the air, it is crowded in and forced toward the outside, in that *maudʔif* ‘location’, *bi-quwwah* ‘with power’.

<sup>59</sup>i.e. the cricoid cartilage. This same cartilage is also called *ʔadiym ʔal-ʔism* ‘lacking a name’.

<sup>60</sup>It is useful to point out that there might be more to *ruʔuwbah* than ‘moisture’ if one were to take into consideration the description of *dziym* [δ3] in chapter 6, where it is illustrated by saying “a drop of water that has *miqdār* ‘quantity’, falling forcefully on *wāqif* ‘at rest’ water and sinking into it”.

<sup>61</sup>i.e. the [ʔ].

## الفصل الرابع في الأسباب الجزئية لحرف حرف من حروف العرب

[ع] أمّا الهمزة فإنّها تحدث من حفز قويّ من الحجاب وعضل الصّدّر لهواء كثير ، ومن مقاومة الطّرجهالي الحاصر زماناً قليلاً لحفز الهواء ثمّ اندفاعه إلى الانقلاع بالعضل الفاتحة وضغط الهواء معاً.

[هـ] وأمّا الهاء فإنّها تحدث عن مثل ذلك الحفز في الكمّ والكيف إلا أنّ الحبس لا يكون تامّاً بل تقعله حافات المخرج وتكون السبيل مفتوحة ، والاندفاع يماس حافته بالسواء غير مائل إلا إلى الوسط.

[ع] وأمّا العين فيفعلها حفز الهواء مع فتح الطّرجهالي مطلقاً وفتح الذي لا اسم له متوسطاً، وإرسال الهواء إلى فوق ليتردد في وسط رطوبة يتدرج (ص. ٧٣) فيها من غير أن يكون قبل الحفز خاصاً بجانب.

[ح] والحاء مثلها إلا أنّ فتح الذي لا اسم له أضيّق، والهواء ليس يحفز على الاستقامة حفزاً بل يميل إلى خارج حتّى يقسّر الرطوبة ويهزّها إلى فدام ، فتحدث من انزعاج أجزائها إلى فدام هيئة الحاء.

[خ] وأمّا الخاء فإنّها تحدث من ضغط الهواء إلى الحد المشترك بين اللّهاة والحنك ضغطاً قوياً مع إطلاق يهترّ فيما بين ذلك رطوبات يعنّف عليها التحريك إلى فدام ، فكأما كادت أن تحبس الهواء زوحت وفسرت إلى الخارج في ذلك الموضع بقوة.

(p.74)

[q]<sup>62</sup>: The *qāf* [q] occurs where the *xāʔ* [x] occurs, except with *habs tāmm* ‘a complete obstruction’. As for air, *miqdāruhu* ‘its quantity’ and *maudʿiʔuhu* ‘its location’, it is that<sup>63</sup> itself.

[ʔ]: As for *ʔayn* [ʔ], it is slightly farther out than that. It does not find either the *rutʿuwbah* ‘moisture’ or the *quwwah* ‘power’ of the air push, that the *xāʔ* [x] finds. The *ḥarakah* ‘motion’, in it, is more inclined towards the *qarār* ‘fixedness’ of the *rutʿuwbah* ‘moisture’ than to forcing it toward the *xāridʒ* ‘outside, because the *ḥarakah* ‘motion’ in it is weaker, and its air flow causes, in the *rutʿuwbah ʔal-ḥanakiyyah* ‘palatal moisture’, something like *ʔalayān* ‘boiling’ and *ʔihtizāz* ‘oscillation’.

[k]: As for *kāf* [k], it occurs where *ʔayn* [ʔ] occurs, and by a *sabab* ‘cause’ similar to it, except that *habsahu* ‘its obstruction’ is *habs tāmm* ‘a complete obstruction’. The relation of *kāf* [k] to *ʔayn* [ʔ] is the relation of *qāf* [q] to *xāʔ* [x].

As for the *kāf* [k] that the Arabs of our generation use in place of *qāf* [q], (p.75), it occurs where the *kāf* [k] occurs, except that it is slightly inner and the *habs* ‘obstruction’ is weaker.

[dʒ]: As for *dʒiym* [dʒ], it occurs from *habs tāmm* ‘a complete obstruction’ by the *tʿaraf* ‘edge/tip’<sup>64</sup> of the tongue, by approximating the front section of the tongue to the surface of the *ḥanak* ‘palate’ that is of diverse parts in terms of *nutuwʔ* ‘protrusion’ and *ʔinxifād* ‘lowering’ with *siʔah* ‘an expansion’ towards the right and the left, and a preparation of *rutʿuwbah* ‘moisture’, so that when it is released, the air flows in that *madʿiyq* ‘narrowing’ in such a manner that *yasʿfiru* ‘it whistles’ due to the *dʿiyq* ‘narrowness’ of the *maslak* ‘passage’ except that *yatašadḏabu* ‘it is modified/trimmed’ due to its broadness, and it completes *sʿafiyrahu* ‘its whistle’ in *xalal* ‘a gap’ between the teeth. Its *sʿafiyr* ‘whistle’ is diminished, and the forward propelled *rutʿuwbah* ‘moisture’ reduces it to a *furquḥah* ‘burst’ in as much as there is *mutafaqqiʔah* ‘something to burst’ in between, then *tatafaqqah* ‘it bursts’, except that the burst in it does not stretch far nor does it become wider, but *tafaqquḥah* ‘its burst’ is at the place where the *habs* ‘obstruction’ is released.

<sup>62</sup>There is some confusion on the sequencing of letters here. From this point on the treatise has a freer sequencing of the letters than what is found in traditional treatises.

<sup>63</sup>i.e. that of *xāʔ* [x] itself.

<sup>64</sup>There is no systematic differentiation between tip and edge of the tongue in the treatise.

(ص. ٧٤)

[ق] تحدث حيث تحدث الخاء ، ولكن بحبس تام. وأمّا الهواء ومقدارُهُ وموضِعُهُ فذلك بعينه.

[غ] فهو أخرج من ذلك يسيراً، وليست تجد من الرطوبة ولا من قوّة انخفاز الهواء ما تجده الخاء ، والحركة فيه إلى قرار الرطوبة أميلُ منها إلى دفعها إلى خارج ، لأنّ الحركة فيها أضعف ، وهوأؤها يُحدث في الرطوبة الحنكيّة كالغليان والاهتزاز.

[ك] فإنّها تحدث حيث تحدث الغين وبمثل سببه ، إلا أنّ حبسه حسب تام ، ونسبة الكاف إلى الغين هي نسبة القاف إلى الخاء وأمّا الكاف التي يستعملها العرب في عصرنا هذا بدل القاف فهي (ص. ٧٥) تحدث حيث تحدث الكاف إلا أنها أدخل قليلاً والحبس أضعف.

[ج] وأمّا الجيم فتحدث من حبس بطرف اللسان تام ، وبتقريب للجزء المقدّم من اللسان من سطح الحنك المختلف الأجزاء في الثنؤ والانخفاض ، مع سعة في ذات اليمين واليسار وإعداد رطوبة حتى إذا أطلق نفذ الهواء في ذلك المضيق نفوذاً يصفر لضيق المسلك ، إلا أنّه يتشدّب لاستعراضه ، ويتمّ صفيره خلل الأسنان ، وينقص من صفيره ويردّه إلى الفرقة الرطوبة المندفعة فيما بين ذلك مُنْفَعَةً ثم تنقأ إلا أنها يمتدُّ بها التقعُّع إلى بعيدٍ ولا يتسع ، بل تقفؤها في المكان الذي يطلق فيه الحبس.

[š]: As for *šiy* [š], it occurs where the *dziym* [dʒ] itself occurs but (p.76) without *ħabs* ‘obstruction’ at all<sup>65</sup>. It is as though *šiy* [š] is a *dziym* [dʒ] that is not obstructed, as it is as though the *dziym* [dʒ] is a *šiy* [š] that was begun with a *ħabs* ‘obstruction’<sup>66</sup>, then it got released<sup>67</sup>.

[dʳ]: As for *dʳād* [dʳ], it occurs from *ħabs tāmm* ‘a complete obstruction’ when the place of *dziym* [dʒ] straightens out, but it occurs in the smoother part. If it is released, *ruʿuwbah* ‘moisture’ or moistures are built up in the *maslak* ‘passage’ that bursts, due to the air that is the *fāʿil* ‘activator’ of the *sʿawt* ‘sound’. It extends across it and it obstructs it a second obstruction, then it splits and *tatafaqqaf* ‘it bursts’, and the shape of the *dʳād* [dʳ] occurs.

[sʳ]: (p.77) As for *sʳād* [sʳ], an incomplete obstruction that is *ʔadʳyaq* ‘narrower’ and *ʔaybas* ‘drier’ than the obstruction for *siyn* [s] produces. Most of the lengthwise *ʔagzāʔ* ‘parts’ of the *ħabs* ‘obstruction’ are inner and outer to the obstruction of *siyn* [s], until the tongue *yutʳbiq* ‘covers’ or almost covers two thirds of the *satʳħ* ‘surface’ that is spread under the *ħanak* ‘palate’ and the *šadzr* ‘velum’; the air escapes from that *madʳiyq* ‘narrowing’ after obstructing a great deal of it from behind and it exits through the *xalal* ‘gap’ of the *ʔasnān* ‘teeth’.

[s]: As for *siyn* [s], it occurs like the occurrence of *sʳād* [sʳ], except that the *ħabs* ‘obstructing’ part of the *lisān* ‘tongue’ is less, both in length and width. It is as though the *ʔadʳalāt* ‘muscles’, that are at the *tʳaraf* ‘edge/tip’ of the *lisān* ‘tongue’, obstruct not in their entirety but at their *ʔatʳrāf* ‘edges’.

[z]: As for *zāy* [z], it occurs from the *musʳfirah* ‘whistling’ causes that we mentioned, except that (p.78) the *ħabs* ‘obstructing’ section of the *lisān* ‘tongue’ is beyond its middle, and the *tʳaraf* ‘edge/tip’ of the tongue is not *sākin* ‘still’ with *sukuwnahu* ‘its stillness’ in the *siyn* [s], but is made capable of *ʔihtizāz* ‘oscillation’. If the *sʳfir* ‘whistling’ air escapes the *maħbas* ‘place of obstruction’, the *tʳaraf* ‘edge/tip’ of the *lisān* ‘tongue’ oscillates to it;

[ش] وأما الشين فهي حادثة حيث يحدث الجيم بعينه ولكن (ص. ٧٦) بلا حبس البتة ، فكان الشين جيم لم يُحبس ، وكان الجيم شين ابُدئت بحبس ثم أُطلقت .

[ض] وأما الصادُ فإنها تحدث عن حبس تام عندما يتقوم موضع الجيم ، وتقع في الجزء الأملس ، إذا أُطلق أُقيم في مسلك الهواء رطوبة واحدة أو رطوبات تتفَع من الهواء الفاعل للصوت وتمتدُّ عليها ، فتحبسه حبساً ثانياً ، ثم تتشقُّ وتتفَع ، فيحدث شكلُ الصاد . (ص. ٧٧)

[ص] وأما الصادُ فيفعله حبسٌ غير تام أضيّق من حبس السّين وأيبس ، وأكثر أجزاء حابس طوياً إلى داخل مخرج السّين وإلى خارجه ، حتى يُطبق اللسان أو يكاد يُطبق على ثلثي السطح المفروش تحت الحنك والشجر ، ويتسرّب الهواء عن ذلك المضيق بعد حصر شيءٍ كثيرٍ منه من وراء ، ويخرج من خلل الأسنان .

[س] وأما السّين فتحدث مثل حدوث الصاد إلا أن الجزء الحابس من اللسان فيه أقلُّ طوياً وعرضاً ، وكأنها تحبس العضلات التي في طرف اللسان لا بكليتها بل بأطرافها .

[ز] وأما الزاي فإنها تحدث من الأسباب المصفرة التي ذكرناها إلا أن (ص. ٧٨) الجزء الحابس فيها من اللسان يكون ممّا يلي وسطه ويكون طرف اللسان غير ساكن سكونه الذي كان في السّين ، بل يُمكن من الاهتزاز ، فإذا انفلت الهواء الصافر عن المَحْبَس اهتزَّ له طرف اللسان ،

<sup>65</sup>This characterization would not be accurate according to our current understanding of this complex sound. [š] is not part of this complex as such, but rather [ʒ] is. It is accurate in terms of the presence of the fricative component following an obstruction in the complex [dʒ].

<sup>66</sup>[d].

<sup>67</sup>[ʒ].

the *rutʿuwbāt* ‘moistures’ that it has and are on it, *ʔihtazzat* ‘they oscillate’, and it has a diminishment of the *sʿafiyar* ‘whistling’, except that in *ʔihtizāzihī* ‘its oscillation’, it causes, in the whistling and coursing air, a quasi-tumble in its narrow passages between the gaps of the teeth. There is almost a quasi-*takriyr* ‘repetition’ in it, that happens to the *rāʿ* [r]; and the *sabab* ‘cause’ for that *takriyr* ‘repetition’ is *ʔihtizāz* ‘an oscillation’ of a part of the *satʿh* ‘surface’ (p.79) of the *tʿaraf* ‘edge/tip’ of the tongue with a hidden oscillation.

[tʿ]: As for *tʿāʔ* [tʿ], it is one of those letters that are produced by *qalʿ* ‘plucking’ without *qarʿ* ‘striking’ or with *qarʿ* ‘striking’. Rather, it occurs by *ʔintʿibāq* ‘covering’ most of the surface of the tongue with the surface of the *ḥanak* ‘palate’ and the *šadʒr* ‘velum’. There may be a detachment of a section of the two of them from its counterpart, with *rutʿuwbah* ‘moisture’ between them, when it is wrenched from it, and the great amount of air got compressed, the *tʿāʔ* [tʿ] is heard.

[t]: *tāʔ* [t], if the *ḥabs* ‘obstruction’ is with a smaller section but like it in *šiddah* ‘tightness’, a *tāʔ* [t] is heard.

[d]: *dāl* [d], if it is with a *ḥabs* ‘obstruction’ like the *ḥabs* ‘obstruction’ of *tāʔ* [t] in *kamm* ‘amount’ but weaker than it in the *kayf* ‘how’, a *dāl* [d] is heard.

[θ]: The *θāʔ* [θ], if there is no complete obstruction where the *tāʔ* [t] is, but a slight *ʔitʿlāq* ‘release’, and with it goes the air whistling, not as strong *sʿafiyar* ‘a whistle’ as the *sʿafiyar* ‘whistle’ of the *siyn* [s], because the *tʿaraf* ‘edge/tip’ of the tongue is (p.80) higher and more constrictive for the air to continue freely through the *xalal* ‘gap’ of the teeth, and it is as though the touching is between the *ʔatʿrāʿ* ‘edges/tips’ of the teeth, a *θāʔ* [θ] is heard.

[ðʿ]: The *ðʿāʔ* [ðʿ], if *ḥabs* ‘an obstruction’ of the *ʔišmām* ‘slight rounding’ were with a small part of the *tʿaraf* ‘edge/tip’ of the tongue, and the passing of the released air, after the *ḥabs* ‘obstruction’, on *rutʿuwbatihi* ‘its moisture’, on the entire surface of the tongue, a *ðʿāʔ* [ðʿ] is heard.

[ð]: The *ðāl* [ð], if the obstruction with the *tʿaraf* ‘edge/tip’ were tighter, but without seeking the aid of the rest of the surface of the tongue, but the air is made to engage, at the obstruction, with what follows the *tʿaraf* ‘edge/tip’ of the tongue (p.81) of *rutʿuwbah* ‘moisture’, so that it moves it and *yahuzzuhā* ‘oscillates it’ a slight oscillation, and escapes in it and in the *xalal* ‘gap’ of the upper

واهتزت رطوباتٌ تكونُ عليه وعنده ونقص من الصفير إلا أنه باهتزازه يُحدثُ في الهواء الصّافر المُتقلّبِ شبهَ التدحرج في منافذه الضيّقة بين خلل الأسنان، فيكادُ أن يكون فيه شبه التكرير الذي يعرضُ للرءاء، وسببُ ذلك التكرير اهتزازُ جزءٍ من سطح (ص. ٧٩) طرفِ اللسان خفيّ الاهتزاز.

[ط] وأمّا الطاءُ فهي من الحروفِ الحادثةٍ عن القلْع دون القَرْع أو مع القَرْع، وإمّا تحدثُ عن انطباقِ سطحِ اللسان أكثره مع سطحِ الحنكِ والشَّجْر، وقد يبرأُ شيءٌ منهما عن صاحبه وبينهما رطوبةٌ فإذا انقلعَ عنه وانضغَطَ الهواءُ الكثيرُ سُمعَ الطاءُ.

[ت] وإن كان الحبسُ بجزءٍ أقلّ ولكن مثله في الشدّة سُمعَ التاء.

[د] وإن كان بحبسٍ مثلِ حبسِ التاء في الكمّ وأضعف منه في الكيفِ سُمعَ الدالّ.

[ث] وإن لم يكن حيثُ التاءُ حبسٌ تامّ، ولكن إطلاقٌ يسيرٌ يصفرُّ معه الهواءُ غيرَ قويّ الصّفيرِ كصفيرِ السين، لأن طرفَ اللسان يكونُ (ص. ٨٠) أرفعَ وأحبسَ للهواءِ من أن يستمرَّ في خللِ الأسنانِ جيّداً، وكأنه ما بين تماسٍ اطرافِ الأسنانِ سُمعَ التاء.

[ظ] وإن كان حبسٌ كالإشمامِ بجزءٍ صغيرٍ من طرفِ اللسان، وإمرارُ الهواءِ المُنتطلقِ بعد الحبسِ على سائرِ سطحِ اللسانِ على رطوبيته، وحفزٌ له جملةً، سُمعَ الظاءُ.

[ذ] وإن كان الحبسُ بالطرفِ أشدّ ولكن لم يُستعَنَ بسائرِ سطحِ اللسانِ ولكن تُنغَلِ الهواءُ عند الحبسِ بما يلي طرفَ اللسانِ من (ص. ٨١) الرطوبةِ حتى يحرّكها ويهزّها هزّاً يسيراً، وينفدُ فيها وفي أعالي خلل



teeth before the release, then it releases; its result is the *ḍāl* [ḍ]. By what *ḍāl* [ḍ] is deficient, with respect to *zāy* [z], is what *ḥāʔ* [θ] is deficient, with respect to *siyn* [s], and that is, it does not empower its air to continue freely in the *xalal* ‘gap’ between the teeth, but it closes its flow from *taht* ‘below’, and it makes it possible *šammihī* ‘to round it’ from above. But with the *ḍāl* [ḍ], it is closer with respect to the oscillation that is present in *zāy* [z].

[l]: If the *ḥabs* ‘obstruction’ with the *tʿaraf* ‘edge/tip’ of the tongue were very *ratʿib* ‘moist’ followed by a *qalʿ* ‘plucking’, and the *ḥabs* ‘obstruction’ were (P.82) average not *šadiyd* ‘tight’, nor is the dependence in it, on the *tʿaraf* ‘edge/tip’ of the tongue, but on what follows it, lest it be a hindrance to the adherence of the *ruʿuwbah* ‘moisture’, then with its *ʔinfilāq* ‘break down’ a *lām* [l] occurs.

[r]: If the *ḥabs* ‘obstruction’ were *ʔaybas* ‘drier’, and neither *qawīyyan* ‘powerful’ nor one, but the *ḥabs* ‘obstruction’ repeats in imprecise *ʔazminah* ‘intervals’, by it are produced *tarʿiydāt* ‘shivers’ in the *ʔiyqāʿāt* ‘rhythms’, and that is because of the *šiddah* ‘tightness’ of the *ʔihtizāz* ‘oscillation’ of the surface of the tongue until there is effected an imperceptible *ḥabs* ‘obstruction’ after a *ḥabs* ‘obstruction’; a *rāʔ* [r] occurs.

[f]: If the *ḥabs* ‘obstruction’ of air were with the soft parts of the *šafah* ‘lip’, and with its seepage between the soft parts without a complete *ḥabs* ‘obstruction’, a *fāʔ* [f] occurs.

[b]: (p.83) If *ḥabs tāmm* ‘a complete obstruction’ were in that same *mawdʿiʿ* ‘location’, and the *ʔitʿlāq* ‘release’ in that same direction itself, a *bāʔ* [b] occurs. The relation of *bāʔ* [b] to *fāʔ* [f] at the *šafah* ‘lip’, is the relation of the *hamzah* [ʔ] to the *hāʔ* [h] at the *ḥandzrah* ‘larynx’.

[m]: If there is a *ḥabs tāmm* ‘complete obstruction’ other than *qawīyy* ‘powerful’, and the obstruction is not all at the exit between the lips, but some of it is there and some of it is in the direction of the *xayšuwum* ‘nostril’, so that *dawīyy* ‘an echo’ is produced when the air traverses the *xayšuwum* ‘nostril’ and the *fadʿāʔ* ‘space’ that is within it, a *miym* [m] occurs.

الأسنان قبل الإطلاق ثم يُطلق، كان منه الذال. والذال يقصرُ به عن الزاي ما يقصرُ به الثاء عن السين، وهو أنه لا يمكن هوائه حتى يستمرَّ جيداً في خلل الأسنان بل يسدّ مجراه من تحت، ويمكن من شمه من أعاليه، ولكن يكون في الذال قريباً من الاهتزاز الذي يكون في الزاي.

[ل] وإن كان حبسُ بطرفِ اللسان رطباً جداً ثم قلع، والحبسُ (ص. ٨٢) معتدلاً غيرُ شديد، وليس الاعتمادُ فيه على الطرفِ من اللسان بل على ما يليه لئلا يكون مانعاً عن التزاق الرطوبة ثم انفلاقها حدث اللام.

[ر] وإذا كان الحبسُ أيبسَ وليسَ قوياً ولا واحداً بل يتكررُ الحبسُ في أزمنةٍ غيرِ مضبوطةٍ كان منه الترعيداتُ في الإيقاعاتِ، وذلك لشدة اهتزاز سطح اللسان حتى يحدث حبساً بعد حبسٍ غيرِ محسوسٍ حدث الراء.

[ف] وإذا كان حبسُ الهواءِ بأجزاء لينةٍ من الشفة، وتسريه في أجزاء لينةٍ من غيرِ حبسٍ تام، حدث الفاء. (ص. ٨٣)

[ب] فإن كان في ذلك الموضع بعينه مع حبسٍ تام، والإطلاقُ في تلك الجهة بعينها حدث الباء. ونسبة الباء إلى الفاء عند الشفة نسبة الهمزة إلى الهاء عند الحنجرة.

[م] وأما إذا كان حبسُ تامٌ غيرُ قويٍّ، وكان ليسَ الحبسُ كله عند المخرج بين الشفتين، ولكن بعضه إلى ما هناك وبعضه إلى ناحية الخيشوم حتى يحدث الهواء عند اجتيازِهِ بالخيشوم والفضاء الذي في داخلِهِ دويماً حدث الميم.

[n]: If in place of the *šafatayn* ‘two lips’, the *tʿaraf* ‘edge/tip’ of the tongue and another *ḥudʿwun ratʿib* ‘moist organ’, *ʔartʿab* ‘more moist’ than the *šafah* ‘lip’, resists the air with the *ḥabs* ‘obstruction’, then most of it seeps in the direction of the *xayšuwum* ‘nostril’, a *nuwn* [n] occurs.

[w]: As to the *sʿāmitah* ‘silent’ *wāw* [w], it occurs where the *fāʔ* [f] occurs, but with slight *dʿaytʿ* ‘pressure’ (p.84) the air push insufficient to prevent it in *ʔindʿiyātʿihi* ‘its pressuring’ the surface of the *šafah* ‘lip’.

[y]: As for the *sʿāmitah* ‘silent’ *yāʔ* [y]. it occurs where the *siyn* [s] and *zāy* [z] occur but with a weak *dʿaytʿ* ‘pressure’ and a push of air that is insufficient to produce *sʿafiyran* ‘a whistle’.

[A]: As for the *musʿawwatah* ‘voiced’<sup>68</sup> *ʔalif* [A] and its sister, the *fathah* ‘opening [a]’, I consider that *maxradʒuhumā* ‘their two exits’, with a *salis* ‘fluent release of the air’, is *ḡayr muzāhim* ‘other than crowded’.

[w-u]: As for the *musʿawwatah* ‘voiced’ *wāw* [w] and its sister *dʿammah* ‘closing [u]’, I consider *maxradʒuhumā* ‘their two exits’, with the release of the air, with the least constriction of the *maxradʒ* ‘exit’, and a fluent inclination upwards.

[y-i]: As for the *musʿawwatah* ‘voiced’ *yāʔ* [y] and its sister the *kasrah* ‘breaking [i]’, I consider *maxradʒuhumā* ‘their two exits’ (p.85), with the release of the air, with the least constriction of the *maxradʒ* ‘exit’, and a fluent inclination downwards.

Then the case of these three is, for me, *muškil* ‘complicated’. But, I know for certain that the *mamduwdah* ‘long’ and *musʿawwatah* ‘voiced’ *ʔalif* [A] is one or more times the *zaman* ‘time’ of the *fathah* [a], and that the *fathah* [a] occurs in the shortest time in which it is adequate to pass from one *ḥarf* ‘letter’ to another *ḥarf* ‘letter’. In the same manner is the relation of the *musʿawwatah* ‘voiced’ *wāw* [w] to *dʿammah* [u], and that of the *musʿawwatah* ‘voiced’ *yāʔ* [y] to *kasrah* [i].

[ن] وإن كان بدل الشفتين طرف اللسان وعضو آخر حتى يكون عضو رطب رطب من الشفة يقاوم الهواء بالحبس ثم يسرب أكثره إلى ناحية الخيشوم كانت النون.

[و] وأما الواو الصامتة فإنها تحدث حيث تحدث الفاء ولكن بضغط (ص. ٨٤) وحفز للهواء ضعيف لا يبلغ أن يمانعه في انضغاطه سطح الشفة.

[ي] وأما الياء الصامتة فإنها تحدث حيث تحدث السين والزاي، ولكن بضغط وحفز للهواء ضعيف لا يبلغ أن يحدث صغيراً.

[ا] وأما الألف المصوتة وأختها الفتحة فأظن أن مخرجها مع إطلاق الهواء سلساً غير مزاحم.

[و] وأما الواو المصوتة وأختها الضمة فأظن أن مخرجها مع إطلاق الهواء مع أدنى تضيق للمخرج وميل به سلس إلى فوق.

[ي] وأما الياء المصوتة وأختها الكسرة فأظن أن مخرجها مع (ص. ٨٥) إطلاق الهواء مع أدنى تضيق للمخرج وميل به سلس إلى أسفل.

ثم أمر هذه الثلاثة عليّ مشكل، ولكني أعلم يقيناً أن الألف الممدودة المصوتة تقع في ضعف أو أضعاف زمان الفتحة وأن الفتحة تقع في أصغر الأزمنة التي يصح فيها الانتقال من حرف إلى حرف. وكذلك نسبة الواو المصوتة إلى الضمة، والياء المصوتة إلى الكسرة.

<sup>68</sup>Voicing here is not identical with what is understood by this term in current linguistic/phonetic literature.

### The Fifth Section-1

#### On the *huruwf* ‘Letters’ that are similar to these *huruwf* ‘Letters’ but are not in the *luyah* ‘Language’ of the Arabs

(p. 86) Here, there are *huruwf* ‘letters’ other than these *huruwf* ‘letters’ that occur between every two letters, in which each of the two is akin to the other in *šarkihi*, ‘its sharing’ in *sababihi* ‘its cause’.<sup>69</sup>

[k]<sup>70</sup>: Among them is the light *kāf* [k] that we have mentioned.<sup>71</sup>

[dʒ]: There are four letters that are similar to *dʒiym* [dʒ], i.e.:

[t]: Among them is the letter that is uttered in the beginning of the noun *ʔal-biʔr* ‘the well’ in Persian, which is *tjāh* ‘well’. This *dʒiym* [dʒ] is the product of *ʔitʔbāq* ‘covering’ by the *tʔaraf* ‘edge/tip’ of the tongue that is *ʔakʔar* ‘greater’ and *ʔašadd* ‘tighter’, (p.87), and of a greater *dʔaytʔ* ‘pressure’ on the air at the *qalʔ* ‘release’. The relation of Arabic *dʒiym* [dʒ] to this *dʒiym* [dʒ] is the relation of the non-Arabic *kāf* [k] to the Arabic *kāf* [k].

There are three letters among them that exist neither in Arabic nor Persian, but exist in other languages. In all of them, it is evident from what is in *dʒiym* [dʒ] in the use of a *rutʔuwbah* ‘moisture’ that affects *dʒarsahā* ‘its ring’, and it is *ʔal-rutʔuwbah* *ʔal-muʔaddah* ‘the ready moisture’ behind the *ħabs* ‘obstruction’, and on it is the dependence of the air at the *ʔitʔlāq* ‘release’. If this *rutʔuwbah* ‘moisture’ were taken away and one were dependent on the *dʒuzʔ* ‘part’ where the *ħabs* ‘obstruction’ occurs, *ħams* ‘a whisper’ occurs there.

Sometimes it tends towards a semi-*zāy* [z], at other times it tends towards a semi-*siyn* [s], ( p.88) and at other time is tends towards a semi-*sʔād* [sʔ].

<sup>69</sup>It makes sense for ʔibn Sīnā, a native speaker of Persian, and who did not leave Persia to live in an Arab country, to reflect on his observations on the manner Arabic was spoken outside its natural confines by speakers of other languages, other than the native speakers. His reflections extend to the speech of the speakers of some Persian dialects and to Turkish.

<sup>70</sup>The comparisons begin with [k]. Notable omissions are all the throat letters, i.e. the laryngeal and the pharyngeal letters including the uvulars.

<sup>71</sup>This *kāf* [k] is the *kāf* [k] that is substituted for the *qāf* [q] among some speakers of Arabic, presumably Persian speakers of Arabic. Cf. pp. 74-75 above, of this treatise.

### الفصل الخامس

#### في الحروف الشبيهة بهذه الحروف وليست في لغة العرب

وهاهنا حروفٌ غيرُ هذه الحروف، تحدث بينَ حرفين حرفين فيما يُجانسُ كلَّ واحدٍ منهما بشريكه في سببه.

[ك] فمن ذلك الكافُ الخفيفةُ التي ذكرناها.

[ج] وحروفٌ تشبهُ الجيمَ وهي أربعة منها الحرفُ الذي يُنطقُ به في أول اسم البئر بالفارسية، وهو "جاه" وهذه الجيمُ يفعلها إطباقٌ من طرفِ اللسان أكثر وأشدَّ وضغطُ (ص. ٨٦) للهواء عند القلْع أقوى، ونسبةُ الجيم العربيةِ إلى هذه الجيم هي نسبةُ الكافِ الغير العربيةِ إلى الكافِ العربيةِ.

ومنها حروفٌ ثلاثةٌ لا توجد في العربيةِ والفارسية، ولكن توجد في لغاتٍ أخرى، وكلُّها بيّنٌ فيها ما في الجيم من استعمالِ رطوبةٍ تفعلُ جرسها، وهي الرطوبةُ المُعدَّةُ وراءَ الحبس، ويكونُ عليها اعتمادُ الهواء عند الإطلاق. فإذا سلّبت هذه الرطوبةُ واعتمدَ الجزءُ الذي وقعَ عليه الحبسُ حدثَ هناك همس.

فتارةً تضربُ إلى شبّه الزاي، وتارةً تضربُ إلى شبّه السين، (ص. ٨٨) وتارةً تضربُ إلى شبّه الصّاد.

[sʰ -s]: As for *sʰād*[sʰ] and *siyn* [s], it is by letting the air flow in the *xalal* ‘gap’ of the teeth without subjecting it to *ʔihtizāz* ‘oscillation’ of the *rutʰuwba* ‘moisture’ that is ahead of it.

[z]: As for the *zāy* [z]-type, it is when exposing it to that, and forgoing an appeal to the *ʔadʰyaq ʔal-maxāridʒ* ‘narrowest of exits’, then the *sʰād* [sʰ]-type and the *siyn* [s]-type are distinguished by the *ʔitʰbāq* ‘covering’.

[s]: Among them is a *siyn* [s] that is of the *sʰād* [sʰ]-type which occurs in using *ʔakbar* ‘a greater’, *ʔaʔradʰ* ‘a wider’ and *ʔabtʰan* ‘an inner’ *dʒuzʔ* ‘part’ of the tongue. (p.89)

[s -z]: Among them is a *siyn* [s] that is of the *zāy* [z]-like that is frequent in the language of the people of Khawarizm. It occurs by preparing the *hayʔah* ‘construction’ from the like of which the *siyn* [s] occurs, then in the *bātʰihah* ‘flattening’ muscle of the tongue *ʔirtiʔād* ‘a trembling’ occurs, as it occurs in *zāy* [z]; That *ʔirtiʔā* ‘trembling’ is accompanied by *mamāssāt xafiyah* ‘hidden contacts’, *ʔayr maḥsuwsah* ‘imperceptible’, by which the air is trapped by *ʔayr maḥsuwsah* ‘imperceptible’ *ʔihtibāsāt* ‘individual obstructions’, then the *siyn* [s] tends to be like the *zāy* [z].

[z-š]: Among those is a *zāy* [z] that is *šiyin* [š]-like. It is heard in the Persian Language when they say *zarf* ‘deep’. It is a *šin* [š] that is not powerful but is manifest by an *ʔihtizāz* ‘oscillation’ of the *satʰh* ‘surface’ of the *tʰaraf* ‘edge/tip’ of the tongue and by seeking the aid of the *xalal* ‘gap’ between the teeth.

[r -ɣ]: Among those is a *rāʔ* [r] that is *ʔayn* [ɣ]-like. Its relation to the *rāʔ* [r] and the *ʔayn* [ɣ] is the relation of this (p.90) Khawarizmi *siyn* [s] to the *zāy* [z] and the *siyn* [s]. It occurs by gurgling with the air the *taʔarɣur* ‘gurgle’ that produces the *ʔayn* [ɣ], then the *tʰaraf* ‘edge/tip’ of the tongue *yurʔad* ‘is set trembling’, or that *ʔirtiʔād* ‘a tremble’ occurs in the *sʰifāq* ‘inner skin/aponeurosis’ of the nostrils so a *rāʔ* [r] that is *ʔayn* [ɣ]-like occurs.

[r-l]: Also a *rāʔ* [r] that is *lām* [l]-like occurs in that one is not limited to *tarʔiyd* ‘trembling’ the *tʰaraf* ‘edge/tip’ of the tongue, but the central muscles of the tongue are relaxed and the peripheral ones *tušannadʒ* ‘are contracted’, so that (p.91) *taqbiyb* ‘a doming’ occurs behind the *tʰaraf* ‘edge/tip’ of the tongue; one depends on sending the air on into that *taqbiyb* ‘doming’ and the *rutʰuwbah* ‘moisture’ that is in it, and the *tʰaraf* ‘edge/tip’ of the tongue *yarʔud* ‘trembles’.

أَمَّا الصَّادُ وَالسَّيْنُ فَبِأَنْ يُسْرَبَ الْهَوَاءُ فِي خَلَلِ الْأَسْنَانِ مِنْ غَيْرِ تَعْرِيبِهِ لِاهْتِزَازِ رَطُوبَةِ قُدَّامِهِ.

وَأَمَّا الزَّائِيَةُ فَعِنْدَ تَعْرِيبِهِ لَذَلِكَ وَتَرَكَ الْجَائِيَةَ إِلَى أَضْيَاقِ الْمَخَارِجِ، ثُمَّ تَقْتَرِقُ الصَّادِيَةُ مِنَ السَّيْنِيَةِ بِالْإِطْبَاقِ.

وَمِنْ ذَلِكَ سَيْنٌ صَادِيَّةٌ تَحْدُثُ مِنْ اسْتِعْمَالِ جُزْءٍ أَكْبَرَ وَأَعْرَضَ وَأَبْطَنَ مِنَ اللِّسَانِ. (ص. ٨٩)

وَمِنْ ذَلِكَ سَيْنٌ زَائِيَةٌ تَكْثُرُ فِي لُغَةِ أَهْلِ خَوَارِزْمٍ، وَتَحْدُثُ بِأَنْ تُهَيَّأَ الْهَيْئَةُ الَّتِي عَنْ مِثْلِهَا تَحْدُثُ السَّيْنُ، ثُمَّ يَحْدُثُ فِي الْعَضَلَةِ الْبَاطِحَةِ لِللسَانِ ارْتِعَادٌ كَمَا يَحْدُثُ فِي الزَّايِ، يَلْزِمُ ذَلِكَ الْارْتِعَادَ مَمَاسَّاتٌ خَفِيَّةٌ غَيْرُ مُحَسُوسَةٍ يَحْتَبِسُ لَهَا الْهَوَاءُ احْتِبَاسَاتٍ غَيْرُ مُحَسُوسَةٍ فَتَضْرِبُ السَّيْنُ لَذَلِكَ إِلَى مِشَابَهَةِ الزَّايِ.

وَمِنْ ذَلِكَ زَائِيٌ شَيْنِيَّةٌ تُسْمَعُ فِي اللُّغَةِ الْفَارْسِيَّةِ عِنْدَ قَوْلِهِمْ: "زَرْفٌ"، وَهِيَ شَيْنٌ لَا تَقْوَى وَلَكِنْ تَعْرُضُ بِاهْتِزَازِ سَطْحِ طَرَفِ اللِّسَانِ وَالِاسْتِعَانَةِ بِخَلَلِ الْأَسْنَانِ.

وَمِنْ ذَلِكَ رَاءٌ غَيْنِيَّةٌ نَسَبْتُهَا إِلَى الرَّاءِ وَالغَيْنِ نَسَبَةُ هَذِهِ (ص. ٩٠) السَّيْنِ الْخَوَارِزْمِيَّةِ إِلَى الزَّايِ وَالسَّيْنِ. وَتَحْدُثُ بِأَنْ يُتَعَرَّغَ بِالْهَوَاءِ التَّعَرَّغُ الْفَاعِلُ لِلغَيْنِ، ثُمَّ يُرْعَدُ طَرَفُ اللِّسَانِ، أَوْ يَحْدُثُ فِي صَفَاقِ الْمَنْخَرِ الدَّخَلِ ذَلِكَ الْارْتِعَادُ فَتَحْدُثُ رَاءٌ غَيْنِيَّةٌ.

وَأَيْضاً رَاءٌ لَامِيَّةٌ تَحْدُثُ بِأَنْ لَا يُقْتَصَرُ عَلَى تَرْعِيدِ طَرَفِ اللِّسَانِ بَلْ تَرْخَى الْعَضَلَاتُ الْمَتَوَسِّطَةُ لِللسَانِ وَتُشْتَجُّ الطَّرْفِيَّةُ، حَتَّى (ص. ٩١) يَحْدُثُ بَعْدَ طَرَفِ اللِّسَانِ تَقْبِيْبٌ، وَيَعْتَمِدُ بِإِرْسَالِ الْهَوَاءِ عَلَى ذَلِكَ التَّقْبِيْبِ وَالرَّطُوبَةِ الَّتِي تَكُونُ فِيهِ، وَيُرْعَدُ طَرَفُ اللِّسَانِ.

[z-ðʔ]: And a *zāy* [z] that is *ðʔāʔ* [ðʔ]-like. In it, the center of the tongue is higher, and the *ʔihtizāz* ‘oscillation’ at the *tʔaraf* ‘edge/tip’ of the tongue is very hidden. It is as though it is in the *rutʔuwbah* ‘moisture’, only.

[lʔ]: Here there is a *mutʔbaqah* ‘covered’ *lām* [[lʔ] its relation to the known *lām* [l] is the relation of the *tʔāʔ* [tʔ] to the *tāʔ* [t]. It is frequent in the language of the Turks, and it is possible, that the *mutafayhiq* ‘sophisticate’ among the Arabs used it.

[f-b]: Here is a *fāʔ* [f] that is almost like a *bāʔ* [b]. It occurs in the language of the Persians when they say: *vizuwniy* ‘excess’. It differs from *bāʔ* [b] in that it has no complete *ħabs* ‘obstruction’, and it differs from *fāʔ* [f] in that there is greater *tadʔyiyq* ‘narrowing’ of the *maxradʔ* ‘exit’ of the sound at the *šafah* ‘lip’, and the *dʔaytʔ* ‘pressure’ of the air is *ʔašadd* ‘tighter’, (p. 92) to the degree that, due to it, *ʔihtizāz* ‘an oscillation’, almost occurs, on the *bātʔin* ‘inner’ surface of the lip.

[b]: Among them is the doubled *bāʔ* [b] that occurs in the language of the Persians when they say: *piyruwziy* ‘victory’. It occurs with a tightness that is strong in the lips at the *ħabs* ‘obstruction’, and a *qalʔ* ‘a release/plucking’ with *ħunf* ‘violence’ and pressure of the air with *ħunf* ‘violence’.

[m-n]: And the *miym* [m] and the *nuwn* [n], the two may be limited to the *dawiyy* ‘echo’ from the air in the *tadʔwiyyf* ‘cavity’ at the back end of the nostril, nor is its obstruction accompanied by a *ħafz* ‘push’ to the air to the outside. This is like pure *ħunnah* ‘nasality’.

وزايٌّ ظائِيةٌ يكوْنُ وسطَ اللِّسانِ فيها أرفعُ  
والاهتزازُ في طرفِ اللِّسانِ خفيٌّ جداً،  
وكأنَّه في الرطوبةِ فقط.

وهاهنا لَامٌ مُطَبَّقةٌ نسبتُها إلى اللامِ المعروفةِ  
نسبةُ الطاءِ إلى التاءِ، وتكثرُ في لغةِ  
الأتراكِ، وربَّما استعملها المتفَيِّهُقُ من  
العربِ.

وهاهنا فاءٌ تكادُ تُشبهُ الباءَ وتقعُ في لغةِ  
الفرسِ عند قولهم "فزونِي" تفارقُ الباءَ بأنَّه  
ليسَ فيها حبسٌ تامٌ، وتُفارقُ الفاءَ بأنَّ  
تضييقَ مخرجِ الصَّوتِ من الشِّفةِ فيها أكثرُ،  
وضغطُ الهواءِ أشدُّ، (ص. ٩٢) حتى يكادُ  
يحدثُ منه في السطحِ الذي في باطنِ الشِّفةِ  
اهتزازٌ.

ومن ذلكِ الباءُ المشدَّدةُ الواقعةُ في لغةِ  
الفرسِ عند قولهم: "بيروزي" وتحدثُ بشدِّ  
قويٍّ للشفتينِ عند الحبسِ، وقَلَعِ بعنفٍ  
وضغطٍ للهواءِ بعنفٍ.

والميمُ والنونُ قد يكوْنُ منهما ما يُقتصرُ فيه  
على الدَّويِّ الحادثِ من الهواءِ في تجويفِ  
آخرِ المنخرِ، ولا يُردِّفُ حبسُهُ عند الإطلاقِ  
بحفزٍ للهواءِ إلى خارجٍ، وهذا كعُنَّةٍ مجردةٍ.

### The Sixth Section-1

In that these *hurūf* ‘letters’ can be heard from *harakātīn* ‘motions’ other than *nuṭʿiqīyah* ‘articulatory’

[ʕ] and [ħ]: (p.93) You hear ʕayn [ʕ] from violent air emission from *maxradʒin ratʿib* ‘a moist exit’.

And the *hāʔ* [ħ] from *ʔadʿyaq* ‘a narrower’ and *ʔaʕradʿ* ‘wider’ *maxradʒ* ‘exit’ than it.<sup>72</sup>

[x]: And the *xāʔ* [x] from *hakk* ‘rubbing’ well any *dʒismin layyin* ‘soft body’, like rind, with *dʒismin sʿalib* ‘a solid body’.<sup>73</sup>

[h]: And the *hāʔ* [h] from *nufuṣ* ‘a penetration’ of air, *bi-quwwah* ‘with power’, into a *ʕayr māniʕ* ‘non-resistant’ *dʒism* ‘body’, like the air itself.

[q]: And the *qāf* [q] from *šaqq* ‘ripping’ of *ʔadʒsām* ‘bodies’ and *qalʕihā* ‘plucking them off, suddenly’.

[ʔ]: (p.94) And the *ʕayn* [ʔ] from the *ʕalayānāt* ‘individual boilings’ of *ruṭʿuwbah* ‘moisture’ in large parts, plunging in one *dʒihah* ‘direction’.

[k]: And the *kāf* [k] from the falling of any big *dʒism sʿalib* ‘solid body’ on another *basiyʿ* ‘flat’, *sʿalib* ‘solid’ like it.

[dʒ]: And the *dʒiym* [dʒ] from the falling of *ruṭʿuwbāʿ* ‘moistures/ liquids’ into *ruṭʿuwbāt* ‘moistures/liquids’ like a drop of water that has *miqdār* ‘quantity’, falling forcefully on *wāqif* ‘at rest’ water and sinking into it.<sup>74</sup>

[š]: And the *šayn* [š] from the *našiyš* ‘hissing’ of the *ruṭʿuwbāt* ‘moistures/liquids’, and from the *nufuṣ* ‘penetration’ of *ruṭʿuwbāt* ‘moistures/liquids’ into the *xalal* ‘gap’ of dry objects with a strong *nufuṣdan* ‘penetration’.

[dʿ]: And the *dʿād* [dʿ] from *ʔinfilāq* ‘bursting’ of big *faqāqiyʕ* ‘bubbles’ from moistures.

<sup>72</sup>It is proper to point out that onomatopoeia is thought to be part of every language, but this discussion is rarely part of a treatise on phonetics.

<sup>73</sup>It will be noticed below that the order of the elements does not follow the regular arrangement of the letters as found in chapter 4.

<sup>74</sup>This description gives an indication that ʔibn Sīnā has richer concept of *ruṭʿuwbah* than might be assumed. The concept that plays such a central part in the description of the sounds in chapter 4.

### الفصل السادس

في أنّ هذه الحروف قد تُسمع من حركاتٍ غير تُطقيّة

[ع] وأنت تسمع العين من كلّ إخراج هواءٍ بعنفٍ عن مخرج رطب.

[ح] والحاء عن أضيق منه وأعرض.

[خ] والحاء عن حكّ كلّ جسمٍ ليّنٍ حكّاً كالقشر بجسمٍ صلب.

[هـ] والهاء عن نفوذ الهواء بقوةٍ في جسمٍ غير ممانع كالهواء نفسه.

[ق] والقاف عن شقّ الأجسام وقلعها دفعةً. (ص. ٩٣)

[غ] والغين عن غليانات الرطوبة في أجزاء كبارٍ تندفع إلى جهةٍ واحدة.

[ك] والكاف عن وقوع كلّ جسمٍ صلبٍ كبيرٍ على بسيطٍ آخر صلبٍ مثله.

[ج] والجيم عن وقع الرطوبات في الرطوبات مثل قطرةٍ من الماء لها مقدارٌ تقع بقوةٍ على ماءٍ واقفٍ فتغوص فيه.

[ش] والشين عن نشيش الرطوبات وعن نفوذ الرطوبات في خلل أجسامٍ يابسةٍ نفوذاً بقوةٍ.

[ض] والضاد عن انفلاق فقايع كبارٍ من الرطوبات.

[s<sup>ʔ</sup>]: And the s<sup>ʔ</sup>ād [s<sup>ʔ</sup>] from the same cause we will mention for *siyn* [s], if it falls into *dʒirm* ‘an object’ with (p.95) *dawiyyin* ‘an echo’ or is accompanied by a *qarʔ* ‘a strike’ with a thing that has a slight *taqʔiyr* ‘hollowing’.

[s]: And the *siyn* [s] from *mass* ‘touching’ of a dry *dʒism* ‘body’ another dry *dʒism* ‘body’ and moving it on it, until air flows between the two of them through very small *manāfiḏ* ‘apertures’; it is also heard from the flow of the air, *bi-quwwah* ‘with power’, through the like of the *ʔasnān* ‘teeth’ of *mušt<sup>ʔ</sup>* ‘a comb’.

[z]: And the *zāy* [z] from something similar to that if one were to interpose in the entrance to the *mamarr* ‘passage’ a thin and pliable *dʒism* ‘body’ like a piece of *dʒild* ‘skin’ that oscillates of itself.

[t<sup>ʔ</sup>]: And the t<sup>ʔ</sup>āʔ [t<sup>ʔ</sup>] from the *tas<sup>ʔ</sup>fiyq* ‘clapping’ of the two hands in such a way that the *rāḥatān* ‘two palms’ do not meet flatly but rather the air is trapped there that has *dawiyy* ‘an echo’, and like it, it is also heard from *qalʔ* ‘plucking’ something similar to it.

[t]: (p.96) And the tāʔ [t] from a strike of the *kaff* ‘palm’ with the *ʔus<sup>ʔ</sup>buʔ* ‘finger’, *bi-quwwah* ‘with power’.

[d]: And the dāl [d] from *ʔad<sup>ʔ</sup>ʔaf* ‘a weaker’ one than it<sup>75</sup>.

[ḏ]: And the ḏāl [ḏ] from the same for the *zāy* [z] if the *muhtazz* ‘oscillating body’ is *ʔaʔd<sup>ʔ</sup>am* ‘greater’, *ʔaylad<sup>ʔ</sup>* ‘thicker’ and *ʔašadd* ‘tighter’ so that *yuxalxil* ‘it shakes’ the air *manfaḏ* ‘escape’.

[θ]: And the θāʔ [ʔ] from the same thing for the *siyn* [s], if it is not *muhtazz* ‘being oscillated’ but the *sadd* ‘closure’ is tighter. The relation of the ḏāl [ḏ] to the *zāy* [z] is like the relation of the θāʔ [θ] to the *siyn* [s].

[r]: And the rāʔ [r] from the *tadaḥrudʒ* ‘rolling’ of a ball on a wooden board. It is of *šaʔnihi* ‘its state’ that *yahtazz* ‘it oscillates’ in such a way that (p. 97) the *ʔihtizāz* ‘oscillation’ is not determined by the *ḥabs* ‘obstruction’.

[l]: And the lām [l] from *s<sup>ʔ</sup>afq* ‘slapping’ of the hand on *ruʔ<sup>ʔ</sup>uwbah* ‘a moisture/liquid’, or the falling of a thing in it *duʔʔatan* ‘all at once’, so that the air is forced *yand<sup>ʔ</sup>ayit<sup>ʔ</sup>* ‘to be compressed’ along with it, then *yans<sup>ʔ</sup>arif* ‘it proceeds’ and is followed by *ruʔ<sup>ʔ</sup>uwbah* ‘moisture’.

[ص] والصاد عن السبب الذي نذكره للسین إذا وقع في جرم ذي (ص. ٩٥) دويٌّ أو كان معه قرعٌ بشيءٍ له تقعيرٌ يسير.

[س] والسين عن مسِّ جسمٍ يابسٍ جسمًا يابسًا وتحركه عليه، حتى يتسرَّب ما بينهما هواءٌ عن منافذٍ ضيقةٍ جداً. ويُسمعُ أيضاً عن نفوذِ الهواءِ بقوةٍ في مثل أسنان المُشط.

[ز] والزاي عن مثل ذلك إذا أُقيم في وجه الممرِّ جسمٌ رقيقٌ لئِن كجلدةٍ تهتزُّ على نفسها.

[ط] والطاء عن تصفيق اليدين بحيث لا تتطبقُّ الراحةان بل ينحصرُ هناك هواءٌ له دويٌّ، ويُسمع عن القلَع أيضاً مثله. (ص. ٩٦)

[ت] والتاء عن قرع الكفِّ بأصبعٍ قرعاً بقوةٍ.

[د] والدال عن أضعف منه.

[ذ] والذال عن مثل الزاي إذا كان المُهتَزُّ أعظمٌ وأغلظٌ وأشدُّ، فيخلخل منفذَ الهواءِ.

[ث] والثاء عن مثل السين إذا لم يكن مُهتَزّاً ولكن كان السدُّ أشدَّ، ونسبةُ الذالِ إلى الزاي كنسبةُ الثاءِ إلى السين.

[ر] والراءُ عن تدرجِ كُرّةٍ على لوحٍ من خشبٍ من شأنه أن يهتَزَّ (ص. ٩٧) اهتزازاً غيرَ مضبوطٍ بالحبسِ.

[ل] واللامُ عن صفقِ اليدِ على رطوبةٍ، أو وقوعِ شيءٍ فيها دُفعةً حتى يضطرَّ الهواءُ إلى أن يضغطَ معه ثمَّ ينصرفَ وتتبعه رطوبةٌ.

<sup>75</sup>Than the strike for the [t].

[f]: And the *fāʔ* [f] from the *ḥafiyf* ‘hissing’ of the trees.

[b]: And the *bāʔ* [b] from *qalʕ* ‘plucking’ of soft *ʔadʕsām* ‘bodies’, that are adhering, from each other.<sup>76</sup>

I think that I have reached sufficiency, and I have expressed the full extent of my knowledge, in getting closer to the honorable sheikh and teacher, may God make me an offering for him.

Here I conclude the treatise, relying on God, He is my sufficiency and most worthy is He of being relied on.

The treatise is completed with thanks to God and His granting of success.

[ف] والفاء عن حفيف الأشجار.

[ب] والباء عن قلع الأجسام اللينة المتلاصقة بعضها عن بعض.

وأظنُّ أنّي قد بلغتُ الكفاية، وعبّرتُ عن المقدار الذي تبلّغهُ مني المعرفة، تقرُّباً إلى الشيخ الكريم الأستاذ، جعلني اللهُ فداه.

فهاهنا أختَمُ الرسالة متوكِّلاً على الله وهو حسبي ونعم الوكيل.

تمَّتِ الرسالة بحمدِ الله وحُسن توقيفه.

<sup>76</sup>One may point out that ʔibn Sīnā omits some sounds, like the hamzah [ʔ], the *ḍāʔ* [ḍ•] and the nasals.