

Medical University Vienna
University Clinic for Emergency Medicine
General Hospital of the City of Vienna
Wahringer Gurtel 18-20/6D, 1090 Vienna
T: +43 (0)1 40400 19520
fritz.sterz@meduniwien.ac.at
www.meduniwien.ac.at

ao Prof.Dr.med.Fritz Sterz
Performing Arts Medicine Physician
Deputy of the Board

Vienna, May 27, 2020

Protocol: Investigation and photographic documentantation of aerosol and condensate emissions from choir members.

In the studio of Mischa Nawrata, phorograher, in 1070 Vienna, Lindengasse 26/2/1, the following appeared on May25, 2020 from 7:00 p.m. to 9:00 p.m.:

- DDr. Karl-Gerhard StraBi MAS, President Choir Association Austria (ChVO)
- The choir singers

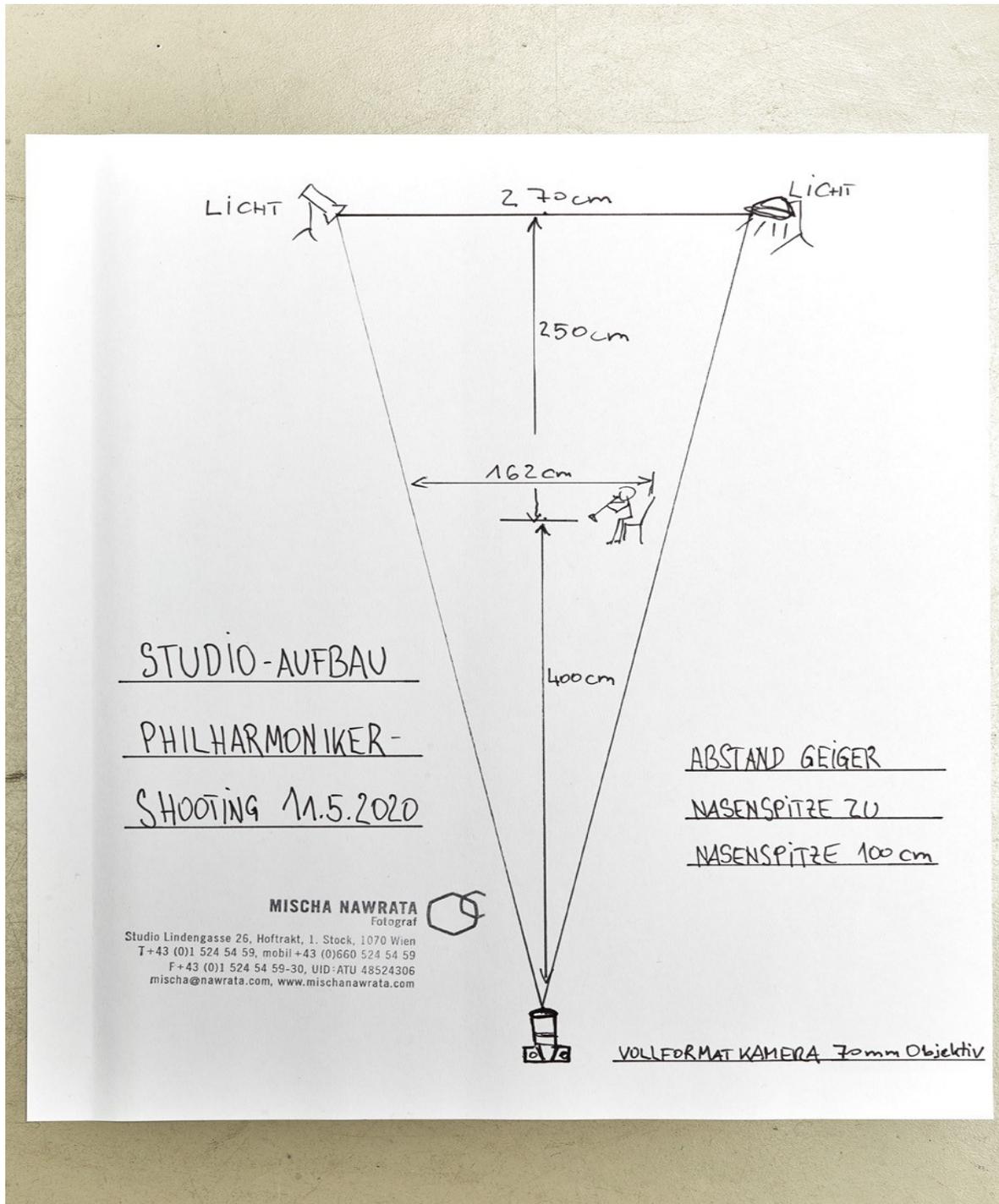
For the semi-professional area, members of the Wiener Singakademie
(Head: Mag. Heinz Ferlesch):

- * Soprano, trained singer (P): Mag. Felicitas Moser
- * Tenor, trained singer (P): Hansfrieder Vogel, M.A.

For the amateur section members of the Wiener Sangerrunde
(Director: Karl-Gerhard StraBi):

- * Alt, Amateur (A): Lotte Herles
 - * Bass, Amateur (A): Mag. Klaus Kabelka
- As medical director of this examination:
 - * a.o. Univ. Prof. Dr.med Fritz R. Sterz, specialist in internal medicine, emergency care and medicine, PAMA & ASCM
Performing Arts Medicine Physician
 - * a.o. Univ. Prof. Dr. Harald Herkner, Msc, specialist for internal medicine, emergency and intensive care medicine.

In a black-lined room, there were particularly strong headlights behind the respective singer on the left and right to make the aerosol emissions visible. The respective choir member was positioned between two black walls, which were set at a distance of around 162 centimeters. The camera was about 4 meters away from the choir singer. This setting corresponded to the arrangement in the experiment with the Vienna Philharmonic.



The photographer Mischa Mawrata took pictures of the choir singers with a CANON full frame camera and a 70 mm lens, in the resting position with just breathing and singing.

- **Alt, Amateur (A): Lotte Herles**
**Legato phrase with vowel*



** Legato phrase with consonants*





- **Bass, Amateur (A): Mag. Klaus Kabelka**
* *Severe exhalation*



* *Legato phrase with vowels*





** Legato phrase with consonents*





- **Soprano, Semiprofi (P): Mag. Felicitas Moser**
* *Legato phrase with vowels*





** Legato phrase with consonants*







- **Tenor, Semiprofi (P): Hansfrieder Vogal, M.A.**
* *Legato Phrase with vowels*





**Legato phrase with consonents*





The photographic representation of exhaled aerosols while singing is successful and impressive. The pictures show a very nice representation of the approximate behavior of air flows, even if the exact scientific measurement is missing, and above all, there is no evidence of the transmission of germs.

With 5 l oxygen per minute, fog (=aerosol) was generated in a small container with a nozzle. With the probes in the nostrils, the mists were continuously giving this mist in addition to breathing. This ensured that the aerosol was dispersed in the upper airways. This made it possible to visualize the distribution of the exhaled air in the backlight.

Quiet breathing in and out according to the norm showed a cloud of fog of maximum 0.5m around the area of the mouth and nose of all choir singers. In contrast, violent exhalation, especially through the “bass”, led to an expansion of ~ 1.5m! When singing, of whatever kind, this aerosol cloud around the head area remained unchanged during music making. The expansion – especially towards the front of minimal parts of the aerosol, extended to a maximum of ~ 0.9m, but with certain Sing techniques with increased vortex formation. Of course, the expansion of this cloud could be significantly limited, above all by mouth-nose protection masks of whatever kind. On the other hand, the “face-shield” enabled a less restricted evasion of the cloud downwards which could not be observed with the mask.

An expansion of the exhaled air by choir singers of more than ~ 1m is not to be expected! Deep inhalation should be avoided and the wearing of mouth-nose mask should be considered when practicing the profession.

Best regards,

ao Univ.Prof.Dr.med Fritz Sterz
Deputy of the Board